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Canada's Natural Resources

CONSIDERING the principal manufactures of the different countries in the world, the influence of the natural resources at the disposal of any country in deciding the nature of its manufactures is clearly seen. But at no time in the history of the universe, excepting war-time emergencies, has the importance of this influence been greater. Reduction in the volume of international trade, suffered by many countries and brought about by frantic strivings towards self-sufficiency, has made the possession of the natural new materials of industry a determining factor of national economic health. Chemistry enters, and is essential to, many of the processes used for the making up of these new materials and their conversion into goods of the most varied description.

The symposium on the natural resources of Canada and their development through chemical research, arranged by the Canadian Chemical Association and held on the day following the annual general meeting of the Society of Chemical Industry at Ottawa, has a comprehensive survey bringing out the industrial and economic progress made; this latter based fundamentally on the country's resources. Dr. G. Stafford Whitby opened the symposium with an introductory paper on general lines which was followed by several contributions on more specialised branches of the subject. Just as in Norway where the abundance of water lead to the development of processes wherein the cheap electricity thus available could be profitably utilised, notably in the production of Nordhausen acid from nitrogen peroxide obtained by the high potential sparking air, so in Canada also the enormous area of water above sea level has given cheap electricity and led to the establishment of electricity-consuming manufactures.

Apart from the pulp and paper industry, which is the largest single consumer of electricity in Canada, electrochemical and electrometallurgical processes are operated extensively. In the electric furnace such products as calcium carbide, silicon carbide, iron alloys and phosphorus are being made and caustic soda, chlorine and hydrogen are produced by the electrolysis of brine (there being, incidentally, extensive deposits of salt available), and hydrogen and oxygen from water. The chemicals thus prepared are well known to be essential primary products for numerous manufacturing operations. Electrolysis is also used in the production of metals, principally aluminium and magnesium, and in refining copper, lead, zinc and the other non-ferrous metals.

> *Meetings of this kind are a reminder of how strong the bonds of common interest and purpose can be. Science, including the applied science of chemistry, recognises no political frontiers and accepts as her servants those in all countries who are engaged in the search after truth and who are working to increase mankind's knowledge of natural phenomena.*
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> —*Lord Leverhulme at the S.C.I. Annual Meeting at Ottawa.*

Canada has large coal resources, but her coal industry suffers from two chief disadvantages. First, the deposits are situated mainly in the west, with the result that it is cheaper to import the coal from the nearer fields in the United States; and second, competition with hydro-generated electricity and natural gas is severe. B. Coulston pointed out in his contribution that the only effective weapon in solving these problems was research; this was now being carried out in investigations designed to extend the demand for coal, and in a complete survey of the characteristics of the coals produced by all the Canadian collieries and the uses for which the coals are best suited.

There is an immense tract of bituminous sand in Northern Alberta, but although this has not at present been developed owing to the present low price of petroleum, Mr. Whitby was of the opinion that it represented a most important potential source of petroleum products which should be thoroughly studied. Until recently there was no substantial Canadian production of oil, but there are now thirty-seven wells in Turner Valley, Alberta, with a potential production of over 30,000 barrels per day. Large quantities of natural gas are also produced in the valley; these can be popolysed, polymerised, hydrogenated, etc., into higher hydrocarbons and alcohols.

Canada is the non-ferrous metal producer *par excellence*. Aside from her production of iron which is of little importance, she produces altogether thirty-four metallic elements and possesses extensive deposits of non-metallic minerals. For generations the name "Canada" has been instinctively coupled in the mind with "lumber."

As regards the heavy chemical industry, I. R. McHaffie showed that it had its beginnings in the manufacture of explosives. The sulphuric acid required was made originally from local pyrites, the contact process being adopted later. Among other leading chemical manufactures are elemental phosphorus and its compounds by electrosmelting of phosphate rock, and calcium carbide used as the primary material for acetic acid, acetate esters, and vinyl resins.

Notes and Comments

The S.C.I. Meeting in Canada

FROM all accounts the Society of Chemical Industry's Canadian trip was an unqualified success in every sense. A party of about sixty members, headed by the President, Viscount Leverhulme, and Lady Leverhulme, sailed from Liverpool on June 10 in the *Duchess of Atholl*. Among the members participating in the trip were: R. R. Bennett, A. V. Beard, E. Brotherton-Radcliffe, K. M. Chance, Dr. W. Cullen, W. A. Damon, Professor F. G. Donnan, O. Dring, Sir Gilbert Morgan, H. J. Pooley, H. V. Potter, H. W. Rowell, Dr. A. Schedler, Dr. F. W. Skirrow, Foster Sproxton, Dr. J. J. Fox, G. King, A. W. Knapp, J. M. Leonard, Dr. R. E. Stradling, J. Sutherland, and P. W. Tainsh. On the first day out from Liverpool, Lord and Lady Leverhulme gave a cocktail party so that everyone could get thoroughly acquainted with everyone else, and by the end of the voyage the party was able to present a strongly united front to the onslaught of Canadian hospitality. On landing at Quebec on the 17th, the members were received by representatives of the Provincial Government and members of local chemical societies. Unfortunately, as the ship arrived some twelve hours late, arrangements had to be considerably modified; but the most important event of the day, the banquet at the Chateau Frontenac, was held as planned.

Résumé of Events on the Tour

ABBE A. VACHON, dean of the Faculty of Science at Laval University, presided over the banquet and the Hon. F. Leduc, Minister of Roads, welcomed the group to the city and province. Lord Leverhulme, Sir Gilbert Morgan, and V. G. Bartram also made speeches which were broadcast. From this time onwards the enjoyable arduousness of the tour really began. On the next day a tour of the city and environs was made in the morning, ending with a presentation to the Lieutenant-Governor of Quebec at the Citadel. In the afternoon, train was taken to Three Rivers where the party was conveyed in private cars, provided by local S.C.I. members, to Shawinigan Falls. Visits were paid to the works of Shawinigan Chemicals, Ltd., on the 19th and the party slept in the special train en route for Ottawa, which was reached the following morning. Here a very busy three days was spent, during which the business of the annual meeting was transacted; this is dealt with at some length in this issue. On leaving Ottawa at the end of the 22nd, the party entrained for Sudbury and thence to Toronto, Hamilton, Niagara and finally Montreal, arriving back at Liverpool this morning. This part of the tour was devoted to works visits, sight-seeing and social engagements. This is but a brief impression of a trip which must remain as an unforgettable experience to all those who joined in it.

Food in Defence

PUBLICATION of the report of the Food (Defence Plans) Department, upon which comment was made in our issue of May 7 last, brought with it a feeling of relief to those who have the question of food in defence at heart and who had been waiting, not without anxiety, for indications of the nature of the Department's work since its foundation in 1936. The report showed that a great deal of valuable statistical information had been collected regarding the amount of foodstuffs required by the population, their sources, and means of distribution and price regulation. It was annouced by the Chancellor of the Exchequer a few days later that stocks of wheat, sugar, and whale-oil had been purchased and arrangements had been made to increase the home output of agricultural produce. It was thought that this was only a beginning, as estimates tended to show that the stocks were sufficient for a supply of about $1\frac{1}{2}$ months only. Also, the types of foodstuffs purchased could not be said to include all the essential products required; fats, for example, were a notable deficiency. The Prime Minister's announcement at Kettering last week is therefore in the nature of a disappointment. He said that the Government had already done all that was necessary to secure the country's food supplies in time of war by laying in food reserves and by working out plans, which would function as soon as hostilities began, for increasing the amount of food we grew. It is especially disappointing that the arrangements made for increasing agricultural production should have ultimately turned out to be plans to be put into operation only should the need arise.

Shellac in Varnish Manufacture

HITHERTO the use of shellac in the commercial manufacture of varnishes has been prevented by the fact that lac only dissolves in drying oils at very high temperatures (above 350° C.) and the product is very prone to get unless great care is exercised. By means of incorporating agents, such as litharge, lime and magnesia, varnishes can be prepared under normal conditions, but the product is usually unsatisfactory in colour. R. Bhattacharya and B. S. Gidvani, of the London Shellac Research Bureau, now describe in the current number of *Paint Technology* three processes of practical importance. In essentials, the first process consists of heating together lac, fatty acids (linseed oil fatty acids) and glycerol in the presence of a catalyst (*p*-toluene sulphonic acid) at 120-140° C. for a number of hours, until the acid value of the varnish falls to about 30°. In the second, the fatty acids are partially esterified with glycerol with the aid of the catalyst at 140°, and lac is then dissolved in the product. This modification is said to be a considerable improvement on the first process as the time required for making a varnish is substantially reduced. In the third process, the catalyst is omitted and the temperature is raised to 180° C. Full practical details of operating the processes are given.

Improving the Status of "Foreign" Companies

NOTWITHSTANDING the restrictive measures imposed by the majority of countries upon the establishment and operation of foreign companies on their territory, the number of business enterprises carrying on part of their manufacturing activity abroad has greatly increased in recent years. These conditions are pointed out by P. Baudouin-Bugnet, in the recent issue of *World Trade*, the journal of the International Chamber of Commerce. The activities of foreign companies have beneficial effects on the country in which they are operating; they contribute to the industrial equipment of the country, increase its economic strength and reduce unemployment. At the same time that encouragement should be given to the establishment of foreign companies, it is necessary that the status of these companies should be secure. For this purpose the I.C.C. has drafted a model bilateral agreement for determining the status and regulating the activity of companies of each of the two contracting countries on the territory of the other.

Meeting of Society of Chemical Industry at Ottawa

Election of Officers—Increased Membership Shown in Annual Report

THE 57th annual meeting of the Society of Chemical Industry, held at the Chateau Laurier, Ottawa, on June 20-22, opened with the business of the annual general meeting on Monday morning, June 20. After confirming the minutes of the 56th annual general meeting, 1937, the following officers were elected:—President, V. G. Bartram (chairman of the Canadian Council); Vice-Presidents, Viscount Leverhulme, Professor J. C. Philip, H. V. Potter and H. W. Rowell; ordinary members of Council, H. E. Cox, Professor W. M. Cumming, F. M. Potter and S. Robson.

Membership More Diversified

Mr. H. J. Pooley, general secretary, then presented the annual report. The upward trend in the membership noticed in last year's report had been more than maintained, but still failed by a considerable number to restore the position lost during the years of industrial depression. New members came from a more diverse field than formerly which seemed to indicate a wider appreciation of the Society's activities. Following the practice of the last two years the membership record was given as that existing at the end of the financial year, December 31, 1937. On that basis the membership was 3,907 as compared with 3,834 at the end of 1936. The new members were 288, but the total was reduced by 109 through resignation, by 42 through death and by 64 through non-payment of subscription. The increased membership was therefore 73 as compared with 63 in the previous year.

The Council had met monthly throughout the session and the meetings had been well attended. While the Society had been fortunate in having Lord Leverhulme as President for the second year they had had to share his services with other organisations, notably with the International Committee of Scientific Management and British Management Council. This had necessitated lengthy absence abroad on several occasions. Mr. W. A. S. Calder had deputised as chairman of Council and had represented the president in several other directions. The president had maintained close interest in the work of administration and particuarly in the Society's relations with other bodies.

Dr. L. H. Lampitt as hon. treasurer, and J. Davidson Pratt as hon. foreign secretary, had throughout the year thrown their full energies into their respective offices and in addition had taken prominent part in the work of most of the committees. The Council had had the advantage at its meetings of the presence, by invitation, of the Chairman of the Chemical Council, Sir R. H. Pickard.

The president-elect, Mr. V. G. Bartram, chairman of the Canadian Council, had attended two council meetings and had used his two visits to become familiar with details of the administration.

Tendency to Promote Joint Meetings

The Local Sections reported increased activity and greater individual interest in the meetings by members and visitors. The papers presented at meetings appeared in most cases to have been selected to cover the interests of the local membership. The tendency to promote joint meetings with the subject groups had been strengthened and the occasions when other bodies with interest in the subjects discussed had been invited to participate had been more numerous than in previous years. There had been a successful combination of social activity of an informal nature with the scientific meetings and the development of discussions in such an atmosphere had promoted a friendly spirit of great appeal to new comers. It was particularly gratifying to record the renewed activity of the Toronto Section.

The following changes were to take place immediately after the annual meeting:—

Section	*Retiring Chairman*	*New Chairman*
American	J. G. Vail.	W. P. Cohoe.
Birmingham	D. W. Parkes.	G. Dring.
Liverpool	T. P. Hilditch.	B. D. W. Luff.
Newcastle	J. W. Craggs.	H. L. Riley.
Ottawa	Alex. E. MacRae.	A. L. Davidson.
South Wales	P. V. Lloyd.	Geo. Madel.
Yorkshire	C. F. R. Brotherton.	B. G. McLellan.
Chemical Engineering Group	S. Robson.	W. Russell.
Plastics Group	H. Langwell.	V. E. Yarsley.
Road and Building Materials Group	F. M. Potter.	G. F. Turner.
	Retiring Secretary	*New Secretary*
Ottawa	A. L. Davidson.	A. K. Light.

The four subject groups had given further evidence of their value in the construction and development of the society's programme. The panel system had been brought into activity and further development on these lines was expected. Movements towards the formation of further groups were in evidence.

The Chemical Engineering Group's twentieth session has comprised nine meetings during which seven districts were visited. Mr. Stanley Robson retired from the chair after three years' occupation during which time the group had launched a scheme of reorganisation which had added greatly to its strength and usefulness.

The Food Group had grown in its numbers and activities; the membership increased by 87 to a total of 539. The tour in Germany centred in Hamburg, the summer meeting at Stratford-on-Avon and the hospitality extended to members on both occasions stood out prominently. The group had taken charge of a session at the annual meeting at Harrogate on the subject of "Fruit Juices." The joint meeting with the Yorkshire Section at Hull had been highly appreciated by a large attendance from both divisions.

A report from the Group to the Ministry of Health on the draft of their new Food and Drugs Bill had been well received, and had been supplemented by evidence given by officers of the group. Two panels, on microbiology and nutrition respectively, were now in action and were already promised substantial support from within and without the group.

In the Plastics Group, steady progress had characterised

Left to right: Dr. William Cullen, Mrs. Cullen, Mr. H. J. Pooley, General Secretary of the Society Chemical Industry, Sir Gilbert Morgan, Mrs. R. R. Bennett and Mr. Bennett, at Euston Station, en route for Canada.

the past session; the membership showed an increase of 32 and became 258. The programme had contained 12 formal meetings, 9 of these being held in conjunction with local sections or with other bodies such as the Institutes of Chemistry and of Plastics, and the Institutions of the Rubber Industry and of Electrical Engineers. Several of these were new connections and suggestions for repetition indicated their satisfactory character. The Group had given evidence before a Departmental Committee inquiring into the use of celluloid.

The Road and Building Materials Group had concluded a most satisfactory fourth year. Thirteen meetings had been held, seven of these being jointly with other Sections of the Society and with the Institute of Petroleum and the Institution of Municipal and County Engineers.

The report of the hon. treasurer showed that notwithstanding a satisfactory increase in the income of the Society it had been again out-stripped by the expenditure.

The Jubilee Memorial Lectures continued to constitute a highly esteemed feature of the Society's programme. For the forthcoming session the lecturers woud be Professor H. L. Riley on the subject of "The Chemistry of Solid Carbon" and Professor W. N. Haworth, F.R.S., on "The Structure of Cellulose and other Polymers related to Simple Sugars."

The Messel Medal was awarded this year to Dr. Leo H. Baekeland, whose career as a teacher, an inventor and an industrialist fully established his merit of this high distinction.

The John Gray Jubilee Scholarship for the current year had been awarded from an entry of three candidates to P. V. Yates, B.Sc., a student of Cardiff Technical College. He had already carried out post-graduate research under Dr. H. E. Watson in chemical engineering at Cardiff. The scholarship allowed him to complete this work under Professor H. E. Watson at University College, London.

The Chemical Council had published its second report and had also given much consideration to the development of a scheme for closer co-operation between the three chartered bodies. This had been drafted as a basis for discussion by the councils of the three bodies, who had now the matter under their consideration.

From the Presidential Address:

The Relation of Science to the World of To-Day

By
VISCOUNT LEVERHULME

CANADA is comparatively a young country, but she has made, and is making, her own very definite contributions to scientific knowledge and to chemical industry. Environment and heredity are determining factors in human progress. The natural resources of Canada have decided the particular fields in which she has been able most conspicuously to influence the progress of chemical industry. Her vast timber supplies have placed her in the forefront of the wood pulp and paper industry. In the field of metallurgy the world's greatest nickel industry owes its existence to the deposits of nickel ore in the Sudbury region of Ontario. Canada, too, is now an important producer of radium, and since she became a world supplier the international price has dropped about 50 per cent. What this means to humanity in terms of ray-therapy can be well imagined.

Viscount Leverhulme.

I have referred to the influence of environment on Canada's chemical and industrial progress. I mentioned heredity as being the other determining factor in progress. The mother country can feel proud that she has not been without substantial responsibility in this regard.

A second year of office, has given me the privilege, but at the same time the responsibility, of delivering a second presidential address. Last year at Harrogate, I developed the theme that a scientific training was a good preparation for life, regardless of whether the individual intended to devote his career to science or to technical work involving the application of the scientific facts he had learned. In my last address I also referred to the chemist as the rationaliser of Nature. I pointed out that we were witnessing to-day the synthetic production of an increasing number of raw materials, and that this was tending to make man less dependent on the accident of geographic and climatic environment. This reliance upon science prompts me to consider in this, my second presidential address, the present relationship between mankind and science. The scientist approaches all problems with one purpose—by means of observation, measurement, and comparison to discover truth. This is a dispassionate quest. He may have preconceived ideas of what the true facts are, based on hopes or intuitions, and rejoice when his discoveries confirm them, but if he twists the facts to fit the theories he is no scientist. Research is objective. A utilitarian purpose, a commercial motive, may inspire the research, but that does not affect the scientific approach to the problem which the research worker brings to bear. Science has contributed enormously to our comfort, well-being, and prosperity, but nearly all these advantages can be traced back to the quest of knowledge for its own sake. The scientist, as a scientist, is not concerned with ethical and moral problems, or with the political issues which may surround the ultimate developments arising from his work. There is hardly a scientific discovery, having a practical application, which cannot be used destructively as well as constructively, for unworthy ends as well as worthy ones.

Although I would not be so rash as to advocate it, there is something to be said, in theory at any rate, for the proposal of a kind of scientific moratorium: the suggestion that scientists should be asked to stay their hand, to give mankind a breathing space and an opportunity to catch up those departments of life and thought where we are still so comparatively backward.

It seems to some that the discoveries of science have completely shattered the accepted beliefs of a century ago. Since the days of Galileo there has been a conflict between scientific progress and the forces of an unbending orthodoxy. Science has not been the aggressor, she has been simply working away at her own objective in her own field. But to those who have opposed her she has seemed at least an "insurgent," a rude disturber of their mental tranquillity. It would seem that just as the ethical development of the human race has not reached the point where it can safely be given aeroplanes and high explosives, so the human mind, in the mass, has

not reached the point where it can adjust itself to these new revelations of scientific inquiry.

Perhaps one of the first effects of the new knowledge unfolded to us by science was to give us what the psychologists call an inferiority complex. The pendulum, however, now appears to be swinging the other way. Science seems to be playing the rôle of psycho-analyst and to be exercising this inferiority complex. To take only one example; if the deductions of modern astronomers are correct, it seems that the birth of the planets from the sun, due to the gravitational pull of a passing star, was a staggering instance of an almost infinitely improbable coincidence, mathematically so infinitely unlikely as to invite a belief in "purpose" rather than in "blind chance."

I have mentioned the word "purpose." Surely that word is at the bottom of much of our modern uncertainty and confusion. Psychology is doing much to give us a deeper understanding of man's mind and emotions and of his behaviour. But, in its own sphere, psychology has limitations like physics and chemistry have in theirs. If man is to become worthier of the gifts of science, he must not impatiently demand of science the answer to every question.

The Jubilee Memorial Lecture :

The Rise of the Plastics Industry*

By
FOSTER SPROXTON

Mr. Foster Sproxton.

THIS review is confined to those plastics in the manufacture of which chemistry plays a predominant part. In its relation to chemistry, the plastics industry has passed through two phases, and is now entering a third. In the first phase, coinciding in time approximately with the second half of the 19th century, it was developed mainly by empirical experimental methods with little scientific control. In the second phase, which is still less clearly defined, but may be taken as the first twenty years of this century, the scientific bases of the work of the pioneers were investigated and a mass of data accumulated. In the third phase in which we are now living, scientific control is being used not only to improve the properties of known materials, but to produce entirely new ones. Science is beginning to predict as well as to investigate.

The fundamental classification of plastics is into the two types, the thermoplastic and the thermosetting. Thermoplastics, as the name implies, possess permanently the property of softening under heat. Thermosetting materials undergo chemical change on heating and become infusible. Each class has certain advantages and certain disadvantages.

The first of the modern plastics to be discovered was the nitrocellulose-camphor plastic. Schönbein discovered nitrocellulose in 1846; he obtained it by nitrating paper, and was first impressed with the increased toughness of the paper, its great resistance to water, and the readiness with which it became electrified. A specimen which he sent to Faraday, presumably shaped from nitrocellulose softened with solvent, was the first nitrocellulose plastic moulding.

Nitrocellulose and Camphor

Parkes, of Birmingham, was a born experimentalist and foresaw the commercial value of a strong cheap material that could be moulded into shapes, but he also saw that as long as the plasticity depended on the presence of volatile solvents like alcohol and ether, it would be fugitive, and the product would shrink and warp on drying. Parkes experimented with solvents of higher boiling point, such as nitrobenzene and obtained a greatly improved material. In his search for plasticisers, he tried camphor, and this substance was mentioned in a patent in 1864, while in 1865, lecturing before the Royal Society of Arts in London, he spoke of the important improvement obtained by the employment of camphor.

Meanwhile in the United States, J. W. Hyatt was at work on the same subject. He encountered the same difficulties as Parkes in the shrinkage brought about by the use of volatile solvents, and went to the other extreme by employing nitrocelluose and camphor with no liquid solvents at all. He relied on the solvent power for nitrocellulose possessed by camphor when liquefied by heat. As camphor melts at a temperature much above the safety limit for nitrocellulose, the process was dangerous, and was ultimately replaced by one in which sufficient ethyl alcohol was used to dissolve the camphor and thus reduce very greatly the temperature at which the material must be worked. Hyatt and his brother made great contributions to the mechanical side of the industry. Hyatt's work resulted in the establishment of the Albany Dental Manufacturing Co., which utimately became the Celluloid Corporation of the United States. In Great Britain the industry was kept alive by Daniel Spill and in due course the British Xylonite Co. was formed in 1877. Nitrocellulose plastic manufacture was established in France and in Germany at about the same time.

The gradual decrease in the price of nitrocellulose plastic in the 'eighties, due to greater production and better methods, increased the number of its applications. The great drawback of nitrocellulose plastic for some purposes was its inflammability. Parkes himself made many attempts to counteract it with various organic and inorganic fillings. Much more technical progress has been made, however, by those who have endeavoured to find new materials with similar plastic properties.

For many years the best known competitor was that made from casein. The problem of diminishing the affinity of casein for water and also sterilising it was solved jointly by Krische and Spitteler in 1897 by the use of formaldehyde, and manufacture on a large scale began in 1904. Although formolated casein has never become an important competitor of celluloid, it has found its own markets. It has the advantage of being relatively cheap, and of taking colours and polish extremely well. It is not strictly a thermoplastic, but it is sufficiently plastic during its manufacture to make possible a variety of controlled configurations.

Another obvious step in the search for a plastic free from the drawback of inflammability was the investigation of esters of cellulose other than the nitrate. The instability of other inorganic esters of cellulose led inevitably to the acetate as the cheapest organic ester. More than forty years elapsed after the first preparation of cellulose acetate by

* Abstract of the lecture presented at the annual meeting on June 20.

Schützenberger before cellulose acetate became an industrial product. Progress previous to the Great War was slow, and was directed more to the production of a non-inflammable film, to meet the needs of the rapidly growing cinema industry, than to the production of massive plastic articles.

During the War, cellulose acetate was required in enormous quantities as the principal ingredient of the tautening dope used on aeroplane wings, and great improvements were made in the solubility and stability of the ester. After the War, this experience bore fruit in the use of cellulose acetate in artificial silk, in films, and in plastics.

The technique of plastic production from cellulose acetate follows that of cellulose nitrate plastic exactly, but its special properties led to the development of a process which is having far-reaching effects on the industry at the present time. Eichengrün in 1919, from analogy with metallurgical practice, was led to investigate the moulding of cellulose acetate by injection. As the name implies, this process involves squirting a mass charged as a powder and rendered plastic by heat into a split mould where it is cooled sufficiently to become rigid.

It is only within the last few years that the process of injection moulding has shown rapid development, perhaps because of the patent situation. At the present time cellulose acetate and polystyrene are the materials most largely used for injection moulding, but all the modern thermoplastic resins are being thoroughly tested in this process. Cellulose acetate in the forms of sheet, rod, and tube has also developed considerably during the last few years.

Plastic Capabilities of Cellulose

The other direction in which the plastic capabilities of cellulose are being examined is the cellulose ethers, particularly the ethyl and benzyl ethers, made by the action of the corresponding chlorides on soda cellulose. Ethyl cellulose, soluble in a variety of solvents, is used chiefly as an impregnating and dispersing material, but it can be plasticised and moulded either by compression or injection. It has a softening point slightly higher than 100° C., is compatible with nitrocellulose, and soluble in a wide range of solvents. Benzyl cellulose is somewhat similar to cellulose diacetate, but has a lower affinity for water. It can be moulded by compression and injection. Both of these ethers are resistant to water and to dilute acids and alkalis. Neither has introduced a new moulding technique, and their high price is an obstacle to their expansion.

Clean-cut statistics of cellulose plastics are available only in certain countries, and even there for a few years only. The world production of nitrocellulose plastics was estimated at 30,000 tons in 1913 and at 35,000 tons in 1924. It was probably greater in 1929, but dropped considerably in the depression of 1930-31. The extent of recovery since has varied in different countries.

The growth of cellulose acetate plastics is indicated by the figures for the United States: 100 tons in 1931, 2,400 tons in 1934, and 5,500 tons in 1935. The world production of casein plastic is approximately stationary at 9,000-10,000 tons, and the tonnage of cellulose ethers is at present insignificant.

We turn now to the other great branch of the plastics industry, the thermosetting plastics, which form at present by far the largest branch of the so-called synthetic resins. Although the spectacular growth of the thermosetting phenol-formaldehyde resins did not begin until about 1924, the fundamental work was done 15 years earlier, and will always be associated with the name of Dr. Baekeland, the Messel medallist for this year. Many investigators from Adolf Baeyer onwards, had been attracted by the reactions between phenols and formaldehyde, and under various conditions and with various catalysts a bewildering series of products had been prepared. Baekeland's publications in 1909 brought order out of chaos, and showed how, under controlled conditions, the well-known phases A, B, and C could be distinguished. He also introduced a filling of wood flour to confer greater strength to the resinous product.

The early phenol-formaldehyde resins were usually prepared in cast form. The growth of the phenol plastic moulding powder industry, the products of which were much tougher than the castings, but opaque, overshadowed the cast resins for many years, but they were revived by Raschig and by Pollak and Ostersetzer a few years ago, and have a considerable vogue in the United States and in Germany. The manufacture of these resins has recently begun in Great Britain. The statistics of the phenol plastics are striking. For the United States the growth of output has been from 6,900 tons in 1932 to 39,000 tons in 1936. In Germany the output in 1933 was estimated at 8,700 tons, and in 1936 at 14,800 tons. Dr. Baekeland recently estimated the value of the present output as £150,000,000 per annum.

Urea-Formaldehyde Resins

The second most important industry employing the technique of the thermosetting moulding powder is that of the so-called amino-plastics, based on the condensation of formaldehyde with urea, thio-urea, or aromatic amines. Industrially these are a post-war development. The discovery of the urea-formaldehyde resins is attributed to Schiff, but the first industrial investigation is due to John in 1920-21. The basic resins are colourless, highly transparent, resistant to light, free from taste and odour, and Pollak and Ripper are identified with the attempt to develop them in cast form as organic glasses in 1925. This was not successful, because of the susceptibility of the resin to humidity, which caused surface crazing and sometimes disintegration. By incorporating cellulosic fillers with urea moulding powders the articles produced withstand without change variations in atmospheric humidity and are washable. Naturally they lose transparency, but can retain a high degree of translucency. A transparent moulding powder has recently been produced. It has a longer curing time, but in view of the excellent colour and light-stability of the urea resins, it will be watched with great interest. Resins made by the condensation of urea and aromatic amines are dark in colour and are used in the manufacture of electrical accessories. The alkyd resins made by the condensation of glycerol and phthalic anhydride are made on a very large and rapidly increasing scale in the United States, but are used chiefly as a varnish ingredient and are therefore outside the present subject.

New Thermoplastics

In the last few years there has been a very striking development of new thermoplastics, not based on natural materials, like the older ones, but prepared by processes which can justly be described by that overworked term "synthetic." All of these plastics are based on the polymerising capabilities of the vinyl group. It was in 1860 that Greville Williams obtained isoprene, which is a vinyl derivative (methyl divinyl) in the distillation products of rubber. Later it was found that isoprene polymerised to a rubber-like material. Synthetic rubber became a necessity for Germany during the war, and her production of polymerised dimethyl butadiene, or methyl rubber, is said to have reached 150 tons per month, at a cost of 30 M. per kilo. This process passed from calcium carbide through acetylene, acetone, and pinacone to dimethyl butadiene, which was polymerised by storage in iron drums to "methyl rubber" as it was called, and was the first large-scale synthesis of a plastic material from acetylene.

A more direct synthesis of a plastic product from acetylene is the production of polymerised vinyl acetate, a process discovered independently in Germany and in Canada. Vinyl acetate can be polymerised by heat, light, and oxygen carriers to a colourless resin, which has the property, undesirable in a plastic, of undergoing cold flow, and perhaps the chief chemical interest in the vinyl acetate resins is the method adopted to convert polyvinyl acetate into a resin

possessing stability of form at ordinary temperature. The polyvinyl acetate is partially hydrolysed, setting free a proportion of the previously acetylated hydroxyl groups. The product is treated with an aldehyde and undergoes the acetal reaction, whereby neighbouring hydroxyl groups are linked into a ring forming part of the straight chain of the simple polymer. The resins so produced are stable in shape in the cold, and therefore suitable for the manufacture of articles.

Another interesting vinyl compound is vinyl benzene or styrene, discovered as long ago as 1831 and first polymerised in 1839. The reasons which have led to the commercial development of this material a hundred years after its discovery are its excellent electrical and water-resisting properties and the availability of cheap methods for the synthesis of the monomer. Like other vinyl derivatives, it polymerises in a straight chain and the degree of average polymerisation can be controlled. It is a clear colourless resin of low specific gravity, good stability to light, and very low power loss, and is used chiefly as a moulding powder in injection machines.

It is particularly interesting to observe how the classic reactions of organic chemistry are being employed in the industrial synthesis of vinyl compounds. The acrylic and methacrylic resins are excellent examples of this. The modern commercial synthesis, first worked out by Bauer in Rohm's laboratory at Darmstadt in 1927, passes from ethylene through the chlorhydrin and nitrile to the unsaturated acrylic acid and its methyl ester.

The polymerisation of the corresponding α-methacrylates was first noted by Fittig in 1877. These resins have been manufactured in the United States and in Great Britain since 1934 by a synthesis passing from acetone through the nitrile to α-hydroxy isobutyric acid, thence by dehydration to the unsaturated methyl acrylic acid and its esters. An abundant supply of cheap acetone is required for the economic manufacture of this resin, and the last few years have shown a very favourable movement in this direction. Both the acrylic and methacrylic resins can be polymerised by heat, light, ozone, peroxides, or other oxygen carriers.

The acrylic resins are noted for their wonderful transparency and absence of colour. These properties are best shown by castings. They can be used as moulding powders for compression moulding, but have not yet been used to any extent for injection moulding.

The polyvinyl chlorides are the simplest of all the vinyl resins. The vinyl-chloride polymers have been developed commercially chiefly in the United States and in Germany, generally as mixed polymers with vinyl acetate or other vinyl compounds, such as acrylates. They can be made practically colourless, and resist water, dilute acids, and alkalis. The mechanical properties of the mixed polymers may vary from high rigidity to a rubber-like consistency.

Production of Cuprous Oxide

A New Russian Electrolytic Method

IN the *Russian Journal of Chemical Industry* (1938, *15*, 41) N. P. Fedotjev and R. N. Kinkulskaya deal with the electrolytic production of cuprous oxide. Laboratory experiments which have been carried out with sodium chloride as electrolyte show that the content of cuprous oxide in the finished product, and the output with regard to the current consumption, rise with increasing temperature, reaching their optimum at 50 to 55°. Current consumption and quality of cuprous oxide are also improved by increasing the concentration of sodium chloride and caustic soda. On the other hand the output is greater either by decreasing the current density (optimum 1.0 to 1.5 amps./sq. dm.), by regularly commutating the direction of the current, or by stirring. When stirring a greater output of 3 per cent. is attained.

Further investigations were carried out concerning the electrode potential at various current densities, electrolyte concentrations, and temperatures. Thus, the potential difference calculated from the sum of potential of the electrodes and of the tension decrease (ohm) of the electrolyte is in the neighbourhood of the electrode tension measured directly by means of the voltmeter. The potential of the cathode being almost independent of the concentration of sodium chloride is very little changed by the current density. It depends only upon the evolution of hydrogen ions at the copper electrode.

Owing to the fact that the processes occurring at the anode have not been made clear the anode potential is more difficult to explain. Contrary to the view given by Abel and Redlich (*Z. Elektrochem,* 1928, *34,* 323) that cuprous oxide is directly obtained on the anode, the authors state that at first copper chloride is formed, and this is converted into the complex salt of copper-sodium chloride owing to the excess of sodium chloride. This salt is then decomposed by means of caustic soda into cuprous oxide. Only in this way the great influence of sodium chloride upon the anode potential may be explained. By increasing the concentration of sodium chloride the formation of the complex salt is more easy, consequently the potential decreases.

The experimental plant consisted of container for the preparation of the electrolyte, electrolysis vats, filters and drying apparatus. The wooden electrolysis vats (1.5 cubic metres volume), of rectangular shape had a conical bottom in the centre of which a copper outlet pipe of 2½ in. diam. was fitted. The current was conducted along the side walls of the vats by means of rails (100 by 20 mm. transverse section) set upon special beams. The electric contact between both rails was carried out through wooden cross beams with a copper conductor (30 by 2 mm.). On these cross beams, the electrodes (180 by 840 mm.) prepared from electrolytic copper were fixed. The area of the immersed part of the electrodes was 1.26 sq. m. (both sides). The electrodes of each vat were arranged in two groups of 10 electrodes each. The electrolyte was heated by means of a metallic coil isolated with rubber.

Cuprous oxide thus obtained, flows from the vat through the exit at the bottom by means of a wooden channel to a vacuum filter (depth 1.900 mm., diam. 1,150 mm.) fitted with a wooden sieve established 0.5 mtrs. beow the filter border, and covered with asbestos paper (2 to 3 mm.) and cotton material. No difficulties were encountered on filtering and washing a layer of 200 to 250 mm. of cuprous oxide. The filtrate was returned to the next electrolysis.

The temperature of the electrolyte during the process was 60 to 70°, the current density 100 amps./sq. m., the total in each vat 1,200 amps., the voltage by arranging the electrodes at a distance of 50 mm. from each other 1.3 to 1.8 volt. The direction of the current was changed every two hours. The concentration of sodium chloride was 260 to 280 grs./litre. It was found that an amount of 4 to 5 gr. of caustic soda/litre was not injurious. If the electrolyte was used for a long time an evolution of 0.4 to 0.8 gr. alkali-carbonate/litre was observed.

From 507 kg. copper electrodes, 358 kg. crude Cu_2O (70.6 per cent.) and 129 kg. copper residue (25.5 per cent.) were obtained, 19.9 kg. copper (3.9 per cent.) being lost. From 461 kgs. sodium chloride 387 kg. (87.6 per cent.) remain after the electrolysis in form of the solution whereas 26.2 kg. sodium chloride were lost through washing, 0.55 kg. (0.1 per cent.) were lost remaining in Cu_2O and 27.9 kg. (6.4 per cent.) were lost by various manner. The analysis of the resulting crude cuprous oxide shows 81.4 per cent. Cu_2O, 0.12 per cent. CuO, 18.42 per cent. H_2O, 0.06 per cent. NaCl.

Symposium on the Natural Resources of Canada

Their Development through Chemical Research

CHEMICAL processes are involved in an essential and often dominant way in many lines of industry in addition to those concerned with the production of chemicals in the narrow sense of the term, said Dr. G. S. Whitby in an introductory paper to the symposium on the natural resources of Canada, arranged by the Canadian Chemical Association for the annual S.C.I. meeting on June 21. Chemistry is involved in important ways in the development and application of energy for machines, and in the production of the materials from which machines themselves are built and on which they operate to fabricate manufactured goods. In the processes of manufacture to which machines are applied chemical change of the raw materials, either in whole or in part and either as a final result or an essential intermediate stage, is involved far oftener than the casual observer realises. Chemistry is involved too at innumerable points in the cultivation of vegetable and animal products and in the processing of them; in their preparation as food, their conversion to clothing, and the production from them of materials for use in manufacturing.

Sources of Energy

There are available for industry in Canada sources of energy in the forms of (a) water power, (b) coal, (c) petroleum, (d) natural gas, (e) bitumen, (f) oil shale, and (g) peat

Canada, with its almost innumerable lakes and its mighty rivers, has 228,307 square miles of fresh water (nearly twice the area of the British Isles), much of which is at a considerable height above sea-water and hence a potential source of energy. Of the electric energy generated in Canada, 98 per cent. is derived from water power. Many lines of electrochemical and electrometallurgical industry have already been established in Canada. And the natural advantages of the country in regard to the production of low-cost hydroelectric energy are such that the application of research to the expansion of such industries should be considered as one of the most important parts of any long-range programme of research in Canada.

The establishment of the first electrothermal industry in the world, the manufacture of calcium carbide, was due to a Canadian, T. L. Willson. The industry which Willson founded has grown to such an extent that the world's production of calcium carbide is to-day about 3,000,000 metric tons a year. It is interesting to reflect that while the only use for which calcium carbide was first manufactured was for lighting (and later, for welding) it has now become the basis for the manufacture of a wide range of important chemicals. It now serves for the manufacture in Canada of a large tonnage of the fertiliser, calcium cyanamide, and of a quantity of sodium cyanide, used in the extraction of gold from its ores and for fumigation against insects. Acetylene generated from it serves for the manufacture synthetically in Canada of acetic acid and acetic anhydride, used in the production of cellulose acetate and for other purposes; of acetaldehyde, paraldehyde, and crotonaldehyde; of acetone, used in varnishes, in explosive manufacture and otherwise; of butyl alcohol and ethyl acetate, used in lacquers; of acetylene black, used in dry batteries; of vinyl acetate resins, used for lacquers and moulding plastics; of the non-inflammable dry-cleaning solvents and degreasing agents, tri- and per-choloroethylene; and other products. Undoubtedly the development of further materials as commercial products will follow the continued application of research effort to the utilisation of acetylene.

Other products of the electric furnace made in Canada are silicon carbide, an abrasive used to cut steel, etc.; fused alumina; ferro alloys (ferrochrome, ferrosilicon, ferromanganese, etc.) used to introduce special constituents into iron and steel; certain special steels; boron carbide, for special cutting tools; periclase (artificial magnesium oxide); artificial graphite and graphitised carbon; phosphorus and, from it, calcium acid phosphate (used in baking powders), disodium phosphate, and trisodium phosphate.

In the electric furnace electricity is used essentially as a source of heat to attain the temperatures necessary for certain chemical reactions and too high to be conveniently obtained otherwise. In other types of electrochemical operations, the electricity itself, not heat generated by it, brings about the desired reactions. Already many important electrochemical operations of this type are practised in Canada. These include the electrolysis of brine, the electrolysis of water, the manufacture of sodium chlorate (a weed killer) and of hydrogen peroxide (a bleaching agent). Products which play important parts in Canadian industry are obtained by the electrolysis of brine. Canada has large reserves of salt available for the future expansion of industries based on the electrolysis of brine and other applications of salt.

Electrochemistry plays an important part in the production of metals in Canada. Aluminium is produced by the electrolysis of a molten bath of the ore along with a flux. Is it unreasonable to suggest that Canada is particularly favourably situated to undertake other similar electrochemical industries involving a heavy consumption of electric energy? To explore the possibility of establishing magnesium production from domestic raw materials, the National Research Council recently set up a research committee on the subject.

Electrolysis, from solution, is used for the refining in Canada of the other non-ferrous metals of which the country is an important producer. Copper, lead, zinc, cadmium, and nickel are all refined electrolytically; so too is some of the silver. Incidental to these refining operations, a considerable number of other elements are recoverd as by-products. The sludge which forms in the electrolytic tanks during the refining of nickel contains the platinum metals. Indeed, thanks to this sludge, the country is now the largest producer in the world of the platinum metals. The slimes from the electrolytic refining of the blister copper from three mines contain considerable amounts of selenium and tellurium, which are recovered therefrom by chemical treatment. Only in the last few years has the Canadian production of these elements become considerable.

The coal reserves of Canada have been estimated to be 1,234,269,310,000 tons, or one-sixth of the world's total. Of this coal, about 0.5 per cent. may be classed as anthracite, 7 per cent. as coking bituminous coal, and 92.5 per cent. as non-coking sub-bituminous and lignite coals. The annual coal production in Canada, about 15,000,000 tons, represents only 1/80,000 of the reserves, although a higher fraction of the reserves of coking bituminous coal. The advantageous use on a larger scale of Canadian coal, having regard to its character and geographical occurrence, will for long provide a wide field for systematic study and research.

Bituminous Sands

One of the most interesting carboniferous resources of Canada is the bituminous sand of northern Alberta. These sands contain on the average about 12 per cent. of a semi-fluid bitumen. They occur over an area of at least 750-1,000 square miles, stretching from the head of the railway, 300 miles north of Edmonton. The deposits contain bitumen variously estimated to be the equivalent of four to ten times the present known oil reserves of the world. The separated bitumen can be made to yield a range of petroleum products, from petrol to asphalt, by destructive distillation and cracking, and higher yields of light oils by hydrogenation. By removing oil by distillation, or by blowing, it yields solid bitumens of various consistencies, suitable for road making, roofing, flooring, rubber compounding, etc. The vast deposits

of Alberta bitumen are perhaps of only limited immediate commercial importance, while crude petroleum is at its present price level.

No really substantial discoveries of oil in Canada were made until recent years. Previously, with the exception of the relatively small production of naphtha in Turner Valley and of oil in other small-yielding areas in Alberta, Ontario, and New Brunswick, the oil requirement of the country (about 37,000,000 barrels a year) has been supplied by imports. Recently, veritable oil wells, as distinct from " wet " gas wells, have been discovered in increasing numbers on the west side of Turner Valley. The potential production of oil from Turner Valley was officially stated late in April, 1938, to be 40,000 barrels a day, although actual production is as yet being held at a considerably lower figure, owing to the limited capacity of the pipe lines and to other circumstances.

Canada now produces in quantities which are important or substantial factors in world markets, the following 22 elements, viz., gold, copper, zinc, lead, nickel, cadmium, bismuth, silver aluminium, antimony, cobalt, arsenic, platinum, palladium, rhodium, ruthenium, iridium, osmium, selenium, tellurium, radium, uranium. She produces, or has produced, in minor quantities, ores of the following eight elements, viz., chromium, lithium, strontium, manganese, molybdenum, mercury, tin, titanium, tungsten. She has, further, some resources of beryllium, tantalum, vanadium, zirconium. Of non-metallic minerals, deposits of the following and others are being operated, viz., asbestos, sodium sulphate, gypsum, anhydrite, magnesite, mica, talc, felspar, diatomite, graphite, bentonite, and also—as raw materials for the production of glass, Portland cement, ceramics, etc.—clay, limestone, silica. The deposits of inorganic salts in Western Canada offer a vast reservoir for chemical development.

Forest Products

Mines are a wasting asset. The forests of Canada, however, are of such a character and magnitude that, if properly managed, they should be a non-wasting and even a growing asset. If wood as a structural material is to maintain its competitive position in face of cement, metal, plastics, etc., it would seem to be desirable that research should be directed, not only to such present subjects of study as the preservation, kiln drying, and painting of wood, but also to the treatment of wood in special ways, by impregnation, special surface finishing, etc., to render it more suitable or decorative for special purposes.

The pulp and paper industry is the largest single manufacturing industry in Canada. Whereas at one time its output was largely in the form of wood pulp, in recent years it has been increasingly in the form of the more highly manufactured product, paper, mostly newsprint, of which Canada exports more than all the other exporting countries together. Canada is an important producer of the specially processed grade of wood pulp used for the manufacture of viscose, but there still remains a large field for the production of special pulps suited to other purposes; to making nitrocellulose, cellulose acetate, and cellulose ethers, to filling moulded plastics, etc.

Then, there is the tremendous challenge to chemical research in the present large waste of organic matter which accompanies the exploitation of forests and the pulping of wood. The profitable utilisation of such wastes would increase the technical and economic efficiency of forest exploitation and must receive an increasing amount of attention in the future.

The ways in which chemistry does and can contribute to Canadian agriculture and fisheries are, however, so numerous and various that no systematic analysis of them can be attempted here. Chemicals in the narrower sense of the term enter into agriculture in the shape of fertilisers, insecticides, fungicides, and weed killers. Other special chemicals (e.g., plant hormones) will, with the progress of research, undoubtedly be provided by chemistry in the future. Soil chemistry has an important part to play in making the best use of present agricultural land and giving intelligent direction to future settlement. Inevitably, cereal chemistry must in Canada rank among the important branches of agricultural chemistry.

Agriculture and Industry

The sooner that there is a closer partnership between agriculture and industry, the sooner will many of the economic problems of our day be solved, said Dr. William Gallay, of the National Research Council, Ottawa. Every ounce of agricultural crop grown, whether it be root, stalk or leaf, fruit, berry or seed, must be considered as a potentially valuable industrial material. This, indeed, is the belief of Mr. Henry Ford and the basic idea behind the " farm chemurgic" movement in the United States. Chemical research in seeking to find optimum methods of production, methods for the utilisation of waste such as straw and surplus crops, and processes for the production of every-day materials used by the urban population from the agricultural products of the farmer, can achieve results of far-reaching significance.

As a result of chemical research, the practice of preserving fruits and vegetables has grown to an enormous scale. Even the potato, although readily available throughout the year, is now marketed on an increasing scale in the canned form. The operations of canning have also raised many problems. A mixture of small quantities of antimony and bismuth to the tin has been shown to reduce corrosion by canned foods. The black discoloration of canned corn was solved by using very small amounts of zinc oxide in the enamel lining of the can. Chemical investigation has shown that there is no appreciable loss of vitamin content of properly canned fruits and vegetables, and the production of synthetic vitamin C now permits the direct enrichment of canned food in this respect. It is now practicable to preserve fruits, vegetables and fruit juices by freezing; the frozen products can be preserved for extended periods without loss of colour, flavour or texture.

The annual consumption of starch and starch products in Canada, said Dr. Gallay, is probably in the neighbourhood of 110 million pounds and the demand is filled almost entirely by starch extracted from imported corn. Chemical research has developed uses for a variety of starch products widely used in such industrial products as textiles, adhesives, confectionery, bakers' goods, artificial silk, leather, foundry cores and explosives.

The manufacture of alcohol for use as a motor fuel is already a well-established industry in Europe; in many countries all motor fuel must contain a proportion of alcohol. There appears little doubt of the relative merit of alcohol for this purpose and the problem has become almost entirely an economic and social one. Products such as butyl alcohol, acetic acid and acetone as well as the better known products of fermentation and distillation such as ethyl alcohol and potable liquors can be and are readily produced from starch or starchy products. Economic considerations will decide the competitive struggle with similar synthetic products from coal and limestone.

The industrial utilisation of the soya bean is one of the greatest accomplishments of the chemurgic movement. Apart from its use in food products in a variety of forms, the oil produced is suitable for use in paints and varnishes and the meal after oil extraction is incorporated in synthetic plastics and in adhesives. There is promise of greatly increased scope for the utilisation of the soya bean.

Petroleum Sources

Important investigations on methods of utilisation of Canadian oil deposits that have been carried out by Dominion Government chemists and chemical engineers, as well as those employed by private companies, were outlined in a paper by Mr. B. Goulston, of the Imperial Oil Co., Ltd. Canada has an oil refinery practically in the artic circle, in a key position to serve mining and aviation developments,

and has just discovered her first really sizable petroleum reserves in the deep limestone of the Turner Valley. As it is 3,000 miles shorter to Asia via Mackenzie River Valley than by direct crossing, these fields will be important to future airways. Apart from the Turner Valley oil field, no abundant supplies of crude petroleum have yet been discovered in Canada. There are, however, large deposits of oil shales in the Maritimes, and what is probably the largest known deposit of bituminous sands in Northern Alberta, estimated to contain a quantity of bitumen equal to four to ten times the present known oil reserves of the world, both of which are potential sources of gasoline and oil.

Canadian oil shales contain no free oil and require heat treatment to decompose the "Kerogen" oil-forming component. They yield from 2 to 48 gallons per short ton. Much work has been done on the properties and methods of refining of the oil obtained. Four semi-commercial efforts have been established in the last decade, but in no case was the venture successful. Apparently, economic working of our oil shales is not likely until the price of imported crude petroleum oil rises considerably.

Recent developments in the Turner Valley field have been spectacular. In 1937 the Canadian production of petroleum rose to nearly 3 million barrels, 93 per cent. of it from the Turner Valley. It is still a fraction of the consumption, and crude oil for refining in Eastern Canada still has to be imported. Turner Valley petroleum yields a gasoline rather high in undesirable sulphur compounds, but chemists have worked out methods by which these deleterious compounds can be removed. Another shortcoming is the low anti-knock qualities which again can be corrected by special treatment. Good quality kerosene and diesel fuels are obtained and the residue makes satisfactory asphalts.

Tremendous quantities of natural gas occur in the Turner Valley, and for the most part this has been burnt as waste. Much research has been done on utilisation of the waste gas and processes have been worked out so far as the technical side is concerned. By heat treatment, benzol and other aromatic compounds useful for fuels and for dyestuff manufacture can be produced. Desirable anti-freeze liquids, various alcohols of value as solvents and other organic liquids valuable as fuels could be produced.

Sulphuric Acid and Chlorine

The manufacture of modern high explosives requires large quantities of nitric and sulphuric acid, according to Dr. I. R. McHaffie, director of research and development, Canadian Industries, Ltd., and Canada is well provided with raw materials and with plants for the production of these basic chemicals. Approximately 250,000 tons of sulphuric acid is made in Canada annually, largely from the sulphur fumes given off in the roasting of sulphide ores at Copper Cliff, Sulphide, and Trail, B.C. Previously these sulphur gases were allowed to escape, spoiling the vegetable growth for miles around the smelters.

Industrial development in one industry frequently leads to rapid progress in another. An outstanding example in Canada is the greatly increased production of chlorine gas. Canada's pulp and paper mills require large quantities of chlorine gas for bleaching wood pulp, particularly when it is to be used for the manufacture of artificial silk and white paper. Chlorine gas is also widely employed in treating City water supplies to render them free from disease-carrying organisms. Another use is in the manufacture of tri- and perchlorethylene now established in Canada, which are increasingly used for dry cleaning and metal-degreasing purposes. The extensive salt beds in Western Ontario provide the sodium chloride, which is transported to Cornwall and Shawinigan Falls, where caustic soda-chlorine plants have been established.

Another example is to be found in the commercial utilisation of the alkali lake deposits in Saskatchewan and Alberta, where it is estimated there are 115 million tons of relatively pure sodium sulphate. The process of smelting the nickel copper ores by the International Nickel Co., at Sudbury, requires a substance "nitre-cake." This was formerly obtained as a by-product in the old process of making nitric acid, which has now been replaced by a process of manufacture from synthetic ammonia. Fortunately, it is simple to make nitre-cake by the action of sulphuric acid on sodium sulphate recovered from the alkali lakes of the Prairies. Thus chemists have shown how to utilise yet another of Canada's natural resources from these lakes, although the costs of the process must not be a costly one, if it is to compete with salt-cake imported from Europe.

About 150,000 tons of sulphur is used annually by the Canadian pulp and paper mills largely imported from Texas, while it is estimated that about 900,000 tons are contained in the waste gases emitted from smelters in Canada. The chemists and engineers of the Consolidated Mining and Smelting Co., at Trail, B.C., have developed a process by which sulphur is recovered from waste smelter fumes, and while there are undoubtedly problems in connection with the economics of such recovery processes it may not be long before the smelters and mines in Northern Ontario and Quebec provide domestic supplies of sulphur for the pulp mills in Eastern Canada.

Metallic Mineral Industry

The part played by scientific research in developing method for treating Canadian ores is outstanding, and the achievements attained are a tribute to the work of the metallurgist and the chemist, stated a paper contributed by the Staff of the Metallic Minerals Division of the Bureau of Mines. Years of extensive research elapsed before a successful separation of the lead and zinc of the Sullivan ore was finally obtained by flotation. A similar problem was encountered and solved in the case of complex copper-zinc ores. The enormous extent of the research involved in the recovery of nickel is well known. In more recent years, the development of Canadian radium and the treatment of complex gold ores and improved metal recoveries serve to show the important part being played by metallurgists and chemists in developing Canada's mineral industry. For the past half-century, the demand for metals has increased steadily. The world has consumed more metallic materials in the last twenty-five years than in all previous history. Such a condition has naturally stimulated the search for minerals and the development of mining in Canada.

Some idea of the growth of the metallic minerals industry in Canada for the past 49 years is gained by comparing the *per capita* value of metallic minerals for the years 1886, 1901 and 1935, which were \$2.25, \$12.16 and \$20.27 respectively, or an increase in total value from \$10,000,000 to \$222,000,000. A number of metallic minerals have either a limited output or are as yet not fully developed to the stage of commercial production. These include antimony, now shipped from British Columbia as a concentrate or treated at Trail, where the Consolidated Mining and Smelting Co. has a mill treating ten tons of residues per day with a yield of four tons of antimony. This amount is about double Canada's present imports.

Fish Products

There is a definite need for research in the chemistry of fish muscle proteins, said Mr. S. A. Beatty, of the Fisheries Research Board of Canada. They are nutritionally adequate, and are used extensively as food for both man and animals. While there are probably at least four different proteins or protein fractions in mammals, myogen, myoalbumen, myosin and globulin X, it has not been shown definitely that there are more than two proteins in fish. The intra-cellular proteins make up about 96 per cent., the stroma proteins about 4 per cent. of the muscle. In mammals, the stroma proteins make up about 14 to 21 per cent. of the total. Further study of the physical chemistry of fish proteins is badly needed. Almost the only work done is that on the effect of freezing, with the

consequent changes in hydrogen ion concentration and salt concentration, which partially explain the deterioration in the quality of stored frozen fish. Much more work has been done on fish fats and oils than on fish proteins. It has been shown that marine oils are definitely different from the fats of land plants and animals, in that they contain a large proportion of highly unsaturated acids of long chains of as many as 24 carbon nuclei. These oils are, for the most part, drying or semi-drying. Excellent paints have been made of blends of linseed oil and certain fish oils. Fish oils are of definite value in the linoleum industry as ingredients of varnishes, in the manufacture of waterproofs. Hydrogenated fish oils are suitable for soaps and for all culinary purposes. Sulphonated fish oils are used as emulsifiers.

Hydro-Electric Power

No country has as much to offer, in so far as cheap power is concerned, to the electro-chemical, electro-metallurgical and allied industries than has the Dominion of Canada, according to Mr. J. B. Challies, president of the Engineering Institute of Canada, a former director of water power for the Dominion and now assistant general manager of the Shawinigan Water and Power Co. There is a sufficient water power reserve to meet all anticipated requirements of every commercial centre in the Dominion from coast to coast, particularly in Ontario, Quebec, Manitoba and British Columbia. Even on the Western Prairies, power can readily be produced from the nearby inexhaustible sources of lignite coal. One outstanding feature of the power situation in Canada is the extraordinary extent to which the fortunately located water powers have already been harnessed. Over 8,000,000 h.p. is presently installed, making it one of the largest *per capita* hydro-electric installations in the world. Mr. Challies pointed out that large blocks of power are now available for purchase at extraordinary low rates at points at, or very close to, ocean ports, particularly in Quebec. The large and growing chemical industry at Shawinigan Falls and the Aluminium Co.'s plant at Arvida, P. Q., are but pre-runners of a future electro-chemical and electro-metallurgical industry of great importance to the Dominion.

Wood Using Industries

Chemists and chemical engineers have made contributions of great economic value to the wood-using industries of the Dominion, according to Mr. T. A. McElhanney, superintendent of the Forest Products Laboratories of Canada. They have produced better glues, especially phenol resin water resistant glues, which are important in the manufacture of plywood, now widely used in building construction and in the manufacture of packing cases. Automatic methods for controlling the moisture, temperature and air circulation in dry kilns have greatly improved the drying of wood and the development of electric instruments for instantaneously measuring the moisture content of wood offer a saving in time.

Important developments in preservative treatment against decay and insect and marine-borer attack have resulted in longer life for railway ties, telephone posts and dock construction. The blue staining of lumber, especially pine, during the seasoning period, resulted in losses of hundreds of thousands of dollars annually, but with the use of organic mercury compounds, sodium compounds and chlorinated phenols, this loss has now been materialy reduced.

Low Temperature Carbonisation Ltd.

Some Points from the Annual Meeting

THE "Coalite" plant at Bolsover has now been operating at full capacity for the past twelve months, said Colonel W. A. Bristow, presiding at the 21st annual general meeting of Low Temperature Carbonisation, Ltd., in London, on July 1. The construction and operating efficiency are remarkably good. The works at Barugh and Askern have been improved by the addition of further plant and machinery, and the products of the company have been still further increased in number and improved in quality. The large coal oil distillation plant at Bolsover is progressing and the first part is now being started up. It has been equipped with the most modern scientific plant and will produce refined petrol, Diesel oil, fuel and other oils, tar acids and pitch. The "Coalite" plant in South Wales has been under construction and should be completed this winter. It will have the same capacity as the plant at Bolsover.

A special "Coalite" has been evolved for vehicles operated by producer gas units. The results are completely satisfactory. The vehicles start quickly without the assistance of petrol, they operate smoothly and efficiently under all conditions, and the cost per ton mile is about one-quarter of the cost of running on petrol. Buses and lorries running on this system are multiplying rapidly on the Continent, and several Governments are actively assisting their operation by legislation and other means.

Negotiations are in progress in South Wales for the supply of gas from the "Coalite" plant to a number of places in the area. This system has been in operation for some time between high temperature coke ovens and the Sheffield Gas Co., and is now being extended to Doncaster.

Further uses have been developed for the tar acids produced by the company. Various new fractions have been prepared and marketed for flotation reagents, disinfectants, germicidal products, soaps, wetting agents, and a number of other purposes. In addition, further work has been carried out in co-operation with the plastics industry, and it appears probable that the tar acids made by this company will constitute a new and valuable raw material for that industry. The production of creosote for wood preservation has been still further extended.

The chemical and research department has been enlarged. In addition to the three works' laboratories, two others have been built at Barugh, and a sixth at Bolsover. In addition, a new central laboratory is approaching completion in London.

Foreign Chemical Notes

Italy

THE S.A. FABBRICHE FIAMMIFERI ED AFFINI, of Milan, is installing an ammonium perchlorate plant at Legnana.

A FACTORY FOR ALCOHOL MANUFACTURE by the Scholler process, from hitherto unutilised wood waste, is being built at Bozen, at a cost of 15 million lire, and will have a daily output capacity of 150 hectolitres absolute alcohol.. A yield of 240 litres alcohol per ton of dried wood is anticipated.

Germany

RICH MERCURY ORES are reported to have been discovered at Feistritz in Carinthia.

THE SCHERING A.G., of Berlin, the merger of Schering-Kahlbaum A.G. and the Kokswerke and Chemische Fabriken A.G., has issued its report for 1937. The net profit amounts to 3.83 million marks, out of which a dividend of 8 per cent. is being distributed.

Vitamin-D in Foodstuffs

A Discussion of Policy

THE food producer and manufacturer in England could neglect vitamins without any loss of business, but if he takes his work seriously he cannot ignore them, according to A. W. Knapp in a paper read to the Food Group at Ottawa on June 22. The demand is for convenient foodstuffs, pleasant to look at and palatable, but for his own satisfaction he must provide the public with food which supplies human needs in nutrition. How best can he do this? Should his method be to use good foodstuffs and retain as far as possible the valuable nutritive properties they possess, or should he add to or subtract from them in an attempt to make up for their natural deficiencies or excesses.

With regard to the ordinary staple articles of diet should we not be satisfied (1) to encourage the consumption of those natural foodstuffs richest in vitamin-D, (2) to encourage producers to have some regard for the vitamin content of their produce, and where foodstuffs, e.g., butter and eggs, are richer in summer than in winter, to endeavour to bring the winter product up to the summer level, and (3) to encourage those who handle or store these foodstuffs, or manufacture them into convenient forms, to retain as far as possible the natural vitamins of the raw materials. It appears that the universal recognition of the importance of vitamins has placed this new duty on to the manufacturers of foodstuffs. Or shall the food producers save the people from deficiency by enriching all their foodstuffs with vitamin-D?

The case of margarine appears to be peculiar to itself. It is not a natural food, but is a wholesome preparation for use in place of butter, and it is good therefore that it should be fortified with the vitamins up to the levels present in good summer butter. Vitamin-D has been added to margarine for some years in a number of countries, in particular England, Norway, and Holland, and additions of vitamins A and D have recently been made compulsory in Denmark.

Nutritional Requirements

The irradiation of foodstuffs has met with little support in England. It is appreciated that it is useless to irradiate any foodstuffs which does not contain ergosterol or other pro-vitamin, and that the only known valuable effect of irradiation is the increase in vitamin-D, whilst the risks of detrimental changes are difficult to guard against.

No single natural foodstuff satisfies all nutritional requirements. Ought we then to add to each what is necessary to make them complete? For example, milk—the most perfect food—is deficient in iron; should we therefore add iron to milk or should we rather encourage the consumption of foodstuffs relatively rich in iron, such as liver, cocoa, and raisins?

If food manufacturers are to add one or more vitamin concentrates to foodstuffs in general the position will become confused. If the addition of vitamins to foodstuffs should develop without due consideration, the producer or manufacturer, in order that he can claim the presence of vitamin-D, may add a mere trace which is so small as to be of no dietetic consequence. On the other hand, we may find every foodstuff offered to the public with substantial additions of vitamin-D, that is, with additions sufficient to supply the whole of the adult requirements of vitamin-D from each individual foodstuff. Who shall determine how much and how many they may add—is it not better to choose one single foodstuff as the recognised vehicle for each vitamin?

The decision of the American Medical Association may be a solution to the problem—they have decided that milk, liquid or evaporated, is the only common food which can be considered for acceptance when fortified with vitamin-D. Milk is a good vehicle as it already contains the necessary calcium and phosphorus. It would naturally be advisable to state the source of the vitamin-D and its potency in International Units. It is evident that frequent and expensive biological assays must be made in order to give a guarantee that the ideal potency is being maintained.

Starch and Bread-Staling

An Indication of a Solution to the Problem

THAT the starch is the fraction of the bread most closely concerned in the staling change appears to have been definitely established, said C. H. F. Fuller in a paper to the Food Group of the Society of Chemical Industry at its Ottawa meeting on June 22. It is reasonably certain that the staling change is due to, or is at least connected with, a reduction in the hydration capacity of the gelatinised starch, which causes a change in the structure of the gel.

The two fractions of starch (α and β amylose, amylose and amylopectin, etc.), the separation of which has claimed the attention of so many investigators, would seem to be forms of the same substance, differing only in the state of aggregation of the basic starch molecule. Partial disaggregation of the starch micelles occurs on heating, altering the proportion of α to β amylose, and there would appear to be a definite equilibrium between the two forms at any one temperature. It is suggested that to the comparatively slow attainment of equilibrium between the two forms may be attributed the phenomenon of staling. If this is so, then "staling" can ony be affected by a major alteration in the equilibrium proportion of α to β amylose, such as would be obtained by keeping the bread at an elevated temperature or by altering the state of hydration of the starch present.

Freezing the bread is an application of the second method; the addition of soluble solids (normally sugars, as in cakes) is another application of the second method. There remains a third possibility—the discovery of some edible substance that, when added to a starch gel, will prevent the molecular re-aggregation. Some evidence has been presented to show that acetaldehyde has this property. Acetaldehyde, of course, is not permissible in a foodstuff in the concentration necessary to affect the staling change, but the fact that the staling change can be so greatly modified in this manner suggests the possibility of an eventual solution to the problem of bread staling.

The Boys' Hostels Association

Great Increase of Work Recorded in 1937 Report

THE report of the Boys' Hostels Association for 1937, which will be submitted to the annual meeting of members on July 13, is a stimulating document. It records not only the tenth anniversary of the John Benn Hostel, at Stepney, but the great development of the Association's work associated with the opening of King George's House, Stockwell, by the King.

It is remarked in the report that this enterprise at once trebled the number of boys for which the Association was responsible. During the year 180 boys were admitted to King George's House, being chiefly recruited from the distressed areas and London County Council public assistance homes. No difficulty has been found at either Hostel in finding employment for the boys, most of whom have been placed in situations with excellent prospects. In both Hostels character building is in the foreground of the Association's purpose, and to this end no opportunity has been lost in giving the boys every facility for leadership. The John Benn Hostel boys accepted full financial responsibility for their club six or seven years ago, and it is hoped that King George's House will speedily develop on the same lines. The Warden proudly places on record the fact that the Hostel boys were responsible for the saving of two lives in the river Medway near their camp at Tonbridge, both under very brave conditions.

GROUND NUTS TREATED with a mixture of ethylene oxide and carbon dioxide are reported to be less susceptible to insect attack, according to H. Raybaud (*Bull. des Matières Grasses*, 1935, No. 5, p. 101).

Building and Road Research in Great Britain

Chemical and Physico-Chemical Testing

WHEN consideration is given to the organisation of research for building and road work, it is soon realised that, though the same or similar materials are used in the two industries, yet the present-day conditions are fundamentally different, said Dr. R. E. Stradling, director of building and road research, D.S.I.R., in a paper read to the Road and Building Materials Group at Ottawa on June 22.

Under the heading of materials at the Building Research Station is included work of a chemical and physico-chemical nature, that is, the investigation of properties other than those usually associated with structural engineering calculations, which are covered by the second heading. The traditional building materials, timber, stone, bricks, limes, all require investigation if they are to be fitted into a scheme of applied science. Timber as a material, however, is not studied at the Building Research Station, but at the Forest Products Research Laboratory.

Weathering of Building Stones

Considerable work has been carried out on the building stones of common use in Great Britain, especially as to their weathering qualities. The manufacturing side has only been touched upon incidentally; the main work has been a study of the causes of efflorescences and decay. Although the study of the individual materials such as stones and bricks is of importance, yet these materials are not used alone and for practical use in building must be associated with mortar. Thus arises the problem of masonry which illustrates the main one of building—to provide weather protection.

A salt which causes much destruction of building stones under English conditions is calcium sulphate produced by the action of sulphur gases in the air on limestone or mortar. To examine the resistance of stones or bricks to the forces produced by the crystallising of salts, a "crystallisation test" has often been used. This consists in alternate immersion of the specimen in a solution of a salt (usually sodium sulphate) and then drying in an oven. The Building Research Station has standardised the conditions of this cycle as a laboratory routine and uses it in the general examination of building stones. The disruption of a porous body by frost is brought about by the stresses developed when water contained in the pores is converted into ice with an increase in volume of approximately 10 per cent.

Porous Building Materials

When a porous body is immersed in water it quickly reaches a degree of saturation beyond which further absorption takes place extremely slowly; months may elapse before the pores become completely filled. The "saturation coefficient" is the ratio between the absorption value corresponding to the natural absorption capacity (usually measured by immersing the sample in cold water for 24 hours) and the total volume of the accessible pore space (*i.e.*, excluding sealed pores inaccessible to water). Experiments have shown that only those materials having high saturation coefficients reach a correspondingly high degree of saturation under natural conditions of exposure to rain, and, speaking broadly, it is materials having high saturation coefficients that fail to give good service in parapet copings and the like. These same materials weather satisfactorily in plain walling.

It has been found by means of exposure tests on samples of known properties that the total porosity should also be taken into account in assessing the frost resistance of a building stone or brick. Materials of high porosity have a lower critical value for the saturation coefficient than those of low porosity.

Under normal conditions of heating, any moisture in the portions of the walls in capillary contact with the inner surfaces will be drawn to these surfaces and evaporated. If soluble salts are present, then these also will be brought to the point from which the moisture vaporises and often result in the destruction of decorations. Particularly is this the case if both alkalis and lime are present and the walls have been covered with normal linseed-oil paints. Recent work by Dr. Bonnell at the Building Research Station indicates that if the moisture in a plastered surface can be so reduced that the relative humidity of an air layer in equilibrium with the water remaining in the plaster does not exceed 65 per cent., such failures are unlikely to occur.

Limes and Plasters

Limes and plasters are materials which depend in their use upon certain chemical actions which have to be controlled by the craftsman on the site of the building operations. Although one of the oldest building materials, lime has given many failures in use in recent years in England. The reason is not far to seek. Great Britain is very rich in varieties of limes, but they differ in the optimum conditions required for slaking and use. The gypsum plasters do not possess in England the long history of limes, yet they date back to pre-scientific times. Modern industrial developments have produced new varieties, and more economical methods of manufacture altered slightly the properties of others.

Certain materials undergo volume changes when they absorb water. For long enough the case of timber has been realised and a very large proportion of the craftsmanship of the joiner is concerned with the correct handling of materials which are subject to considerable volume changes with changing moisture conditions. It had not been realised until recent years, however, that similar effects occurred with such materials as sandstone and concrete, for example. The volume changes of these inorganic materials are not so great as with timber, but they are sufficient to give serious trouble at times in construction. Strength data for certain stones is useless if the moisture content at the time of testing is not stated.

Heating and ventilation work has been in hand for some years and recently, by the co-operation of the Institution of Heating and Ventilating Engineers, a special laboratory has been erected. The work at present in hand consists of comparisons of various forms of heating, distribution of heating units, and the like. There is also a special committee of the Department of Scientific and Industrial Research which advises on illumination work and most of this is carried out at the National Physical Laboratory.

Fire Resisting Tests

Fire resistance work is a fairly large section and is a co-operative effort between the Fire Offices' Committee and the Building Research Station. Work in hand at present comprises a long series of British Standard tests on normal non-proprietary building units upon which it is hoped to base grading rules for by-laws, development work on tests for roofing materials, and investigations as to the effect of restraints and other structural design points upon the fire resistance of units. Investigations involved in the "fire-proofing" of timber are carried out at the Forest Products Research Laboratory.

By far the largest section of the work of the Road Research Laboratory is that dealing with bituminous materials and a fair proportion of this is carried out in co-operation with manufacturers and construction firms. In particular, mention must be made of the British Road Tar Association and the Asphalt Roads Association.

In the relatively "crowded" conditions of England it was

early discovered that the use of tars in certain ways on the roads could and did lead to serious troubles in the poisoning of fish in the streams which received the road washings. To overcome this difficulty a special non-toxic tar was developed.

Non-toxic tar produced by the Gas Light and Coke Co., has been the subject of a successful full-scale test at the Ministry of Agriculture and Fisheries Research Station, Alresford, Hants, in 1931. In their process (B.P. 408,275) soft pitch obtained by distillation of dehydrated tar in a pot-still is maintained at a temperature above 300° C. without distillation, until its content of phenolic substances is thereby reduced to a suitable figure. The product is fluxed with a tar oil from which phenols, bases, and crystallisable naphthalene have been previously removed. Following this successful trial, the Government departments concerned drew up a comprehensive specification to which non-toxic tars should conform.

The problems involved in studying bituminous materials are many and complex; not the least is the fact that the testing of such materials in practice on the highway automatically involves long periods of time, amounting generally to years. In general, the opinion seems to be that few, if any, of the small-scale laboratory tests show real correlation with road practice. The first and, for some time, the major problem faced by the Road Research Laboratory was the designing of some method of test for road materials which would reduce very considerably the time required for testing under practical road conditions and, at the same time, would correlate with such conditions. Thus arose the scheme of road machines which occupy such a prominent place in the equipment of the Road Research Laboratory.

Ten Years Back

From "The Chemical Age," July 7, 1928

A new Japanese company, the Toyo Babcock Kabushiki Kaisha, was recently formed by a combination of interests between Babcock and Wilcox and the powerful Mitsui Co., and is to develop processes of low temperature carbonisation of coal and the distillation of oil from shale.

* * * *

The invention of two processes for the manufacture of artificial wool is reported from the Continent, and it is stated that manufacture on a commercial scale is to be commenced. M. Augustine Pellerin, a French chemist, has invented one process, which is said to utilise cellulose waste. The other process is that of Dr. G. Hartig, of Chemnitz, and negotiations for the British rights of this process are said to have been opened by a Lancashire textile firm.

* * * *

Italy imported 2,359 metric tons of dyes and paints from Germany last year, out of total imports of 6,624 metric tons. In 1913, 7,922 metric tons out of 11,926 metric tons were imported from Germany.

Power Alcohol from Molasses

Developments in India

THE commercial possibility of the manufacture of power alcohol from molasses is stressed, and the unanimous recommendation for the establishment of a power alcohol industry in the United Provinces and Bihar, India, is made in the report of the expert committee recently appointed by the Governments concerned. The committee was asked to devise ways and means of starting the manufacture of power alcohol from molasses, to report the best method of manufacture and mixing power alcohol from molasses and that it can be manufactured at a cost which would enable the Government to levy an excise duty of Rs 0-10-0 per gallon on the production and importation of petrol. The committee has also expressed itself in favour of the establishment of the industry under the control of provincial Governments and has recommended the constitution of a Power Alcohol Advisory Board representing the various interests concerned. At present the United Provinces and Bihar have a surplus of over 25,000 tons of molasses, which is running to waste in the absence of any suitable outlet therefor.

Special interest attaches to an investigation being carried out in the applied chemistry laboratory of the University College of Science, Calcutta, on the products that are obtainable from country "gur" and molasses by the action of different micro-organisms. Satisfactory results have been obtained by fermentation with *Mucor* under varied conditions. A "gur" solution containing 3 per cent. sugar (calculated in terms of reducing sugar) was used. As sources of nitrogen 1 per cent. ammonium sulphate, peptone, casein, gelatin and urea were used in different experiments. The pH was varied between 3 and 7.2 and the temperature of incubation was 28° (room temperature).

After seven days' incubation with ammonium sulphate as the source of nitrogen, the maximum yield of nitric acid (33 per cent. of the sugar) was obtained at pH 4 and no oxalic acid was formed. After seven days' incubation with peptone the maximum yield of citric acid (29 per cent. of the sugar) was obtained at pH 4 and that of oxalic acid (28.1 per cent. of the sugar) was obtained at pH 5.6. After 14 days' incubation with ammonium sulphate the maximum yield of citric acid (22.13 per cent. of the sugar used) was obtained at pH 4 and no oxaic acid was formed. With peptone, after 14 days' incubation no citric acid was formed, but a maximum yield of oxalic acid (16.75 per cent. of the sugar) was obtained at pH 5. With casein or urea or ammonium chloride after 12 days' incubation citric or oxalic acid was not formed, and with gelatin growth of the *Mucor* was not good.

Similar results have been obtained with molasses and it would seem that under favourable conditions yields of citric acid and oxalic acid of the order of 33 per cent. and 17 per cent. may be obtained and citric acid may also be obtained free from oxalic acid.

Chemical Matters in Parliament

Chemical Research (New Compounds)

IN the House of Commons on July 4, Mr. David Adams asked the Chancellor of the Duchy of Lancaster, as representing the Lord President of the Council, whether he is aware that the firm of May and Baker, Ltd., are obliged to refuse requests for supplies of newly-discovered chemical compounds, because of the dangers involved, until further research has been carried out; and what steps he is taking to expedite the necessary research in this and similar cases?

In reply, the Chancellor of the Duchy of Lancaster (Earl Winterton) said it is the ordinary and necessary practice in the case of new drugs that they should in the first place be subjected by specialists to carefully controlled trials, as regards their value and safety, in order to ascertain whether the medical results warrant production on a large scale for general distribution. The hon. Member may have particularly in mind a new compound which is being tried in the treatment of pneumonia, and about which the firm named recently published a statement that the work was still in an experimental stage. The manufacturers have not so far thought it necessary to seek the aid of the Medical Research Council in this case, but it is understood that the requisite investigations are in active progress.

THE DYNAMIT A.G. VORM. ALFRED NOBEL & CO., of Troisdorf, reports a gross turnover of 58 million marks in 1937 (previous result 40 million) and a net profit of 1.81 million marks (1.59). Ordinary shares receive a dividend of 4 per cent ($3\frac{1}{2}$ per cent.) and preference shares one of 6 per cent. (unchanged). The explosion reserve has been raised from 2 million to 4.55 million marks.

Lesser Known Uses of Wool

Cosmetics, Adhesives and Therapeutic Products

BESIDES its textile applications wool is coming to be regarded partly as a raw material from which other products and specialities may be obtained. Wool fat is already much used in pharmacy and in the making of cosmetic mixtures, but that substance is only a by-product; the substance of wool is seen in one or two recent discoveries to have an intrinsic value of its own as a basis for preparing toilet powders, face creams, adhesives and therapeutic products.

According to R. W. Lawson, wool may be reduced to the state of a fine powder suitable for addition to toilet preparations and creams for the skin. After purification it is to be treated with caustic soda solution in the coal for 6 to 24 hours, which treatment is considered to reduce the resistance to grinding without bringing about too drastic a degradation of the keratinous substance. The mass is neutralised, washed, dried and powered in a pestle and mortar or other suitable apparatus. A face cream may contain 50 per cent. of this powder whose influence is stated to be soothing to the skin. A toilet powder may comprise 50 per cent. of wool powder, and 25 per cent. each of starch and talcum. (B.P. 482,269).

Treatment with Alkalis

The treatment of wool with alkalis to bring about degradation of the keratin with a view to obtaining useful derivatives is not new, but the revival of interest in the subject justifies reference to an earlier invention of S. R. Trotman and Wolsey, Ltd. (B.P. 329,766). In this process wool degradation is brought about by heating it under pressure with borax or sodium carbonate, but is not permitted to go beyond a certain point. While it is desired that the product should be soluble in water, it should also be of sufficient complexity to be precipitated with certain chemicals. After being well cleansed, wool fibres are mixed with a dilute solution of borax, 1 to 2 parts per 100 parts by weight of wool dissolved in water weighing some 15 to 20 times that of the wool. The mixture is then heated for 2 hours at the boil under 2 atmospheres pressure. The resulting solution is to be filtered, concentrated and evaporated to dryness.

The product may be employed alone or mixed with glue as an adhesive, for loading and dressing textile fabrics, for treating artificial and natural fibres generally, in some cases in conjunction with tannic acid which precipitates it within the fibres.

Hydrolysis Residues

Therapeutic products may be obtained by treating the hydrolysis residues of wool with compounds of gold. According to Schering-Kalhbaum A.G., wool or hair is digested with dilute hydrochloric acid on a water bath until dissolved. It is neutralised with ammonia and auric chloride is added until the precipitate, which at first goes into solution, remains permanently. The mixture is next rendered neutral with caustic soda and poured into alcohol when the keratin-gold compound, containing 6 per cent. of that metal, separates out. (B.P. 479,358).

In addition to keratin derivatives of gold, products from other metals have been prepared, all claimed to have therapeutic values. B.P. 481,164 to the above inventors relates to the preparation of keratinates containing the alkaline earth metals, calcium, magnesium, etc. B.P. 412,366 to Wulfing and Moller describes the making of zinc, silver, mercury, bismuth and antimony compounds. In B.P. 437,769 the same company discloses details for obtaining arsenic compounds from keratin. The I.G. Farbenindustrie propose to prepare tin compounds from degraded wool in B.P. 345,630, while Wulfing and Moller refer to lead salts in patents 454,813 and 459,747.

Other patents in this field which may repay study are B.P. 247,944 and 370,295.

Mr. C. J. T. Cronshaw

Receives Honorary Degree from Leeds University

MR. C. J. T. CRONSHAW, managing director of the dyestuffs group of Imperial Chemical Industries, Ltd., received the honorary degree of D.Sc., from Leeds University on July 4. He entered Victoria University, Manchester, in 1911, graduated in 1914, joined Strange and Graham (synthetic rubber manufacturers), and shortly afterwards went to Levinstein's as a chemist in their research department. In 1916 he took over the Indigo Works at Ellesmere Port, previously owned by Meister, Lussius and Bruning, and despite great initial difficulties started the manufacturing process again in a remarkably short time. In 1917 he was sent to America over the exchange of technical information between Levinstein's and DuPont's and on the signing of the Armistice spent some time in Cologne as chemical controller of the British occupational area. In 1919, on the formation of British Dyestuffs

[The Yorkshire Post.

The Lord Mayor of Leeds (Alderman J. Badlay), the Prime Minister and Mr. C. J. T. Cronshaw at Leeds Town Hall on Monday, after receiving honorary degrees at the University's annual congregation.

Corporation, he was appointed to the position of Dr. Levinstein's chief administrative assistant, and in 1921 became manager of the Blackley works. In 1924 he was appointed technical manager of the B.D.C. and in 1928, when B.D.C. was incorporated in I.C.I., Ltd., was elected deputy chairman of the management committee and a member of the delegate board. He became managing director in 1931. Mr. Cronshaw is a member of the British Colour Council, and for many years was a member of the Dyestuffs Development Committee. He was awarded an honorary fellowship by the Institute of Chemistry in 1927, and elected to the Livery of the Dyers' Company in 1928.

A Correction

WITH reference to the report of the fire at the Netherton Works of the Ioco Rubber and Waterproofing Co., Ltd., published in the June 18 issue, page 489, the company has informed us that this report is erroneous. The fire which occurred only affected a very, very small section of the factory and the production and output of the company's well-known products has been maintained since the outbreak and will continue to be maintained. It was also a complete misstatement to say that gun-cotton is stored at the works as no such material is kept at the factory.

Personal Notes

MR. THOMAS MACAULAY, founder of the Macaulay Institute for Soil Research, Aberdeen, has arrived in Scotland from Canada, and on July 20 he will be admitted an honorary freeman of Stornoway, Isle of Lewis.

MR. RONALD JAMES PEMBERTON, chief chemist to Fison, Packard and Prentice, Ltd., Ipswich, was recently married at Old Felixstowe Parish Church, to Miss Eunice Margaret Sherman, of Ipswich and Felixstowe.

MR. WILLIAM KILBY (Standfast Dyers and Printers, Ltd.), and MR. T. MCQUILLEN (Jas. Williamson and Son, Ltd.), have been appointed members of the chemistry advisory sub-committee of the Technical College, Lancaster.

THE LATE CAPTAIN LIONEL DIGBY WHITEHEAD, of Abergavenny, chairman and managing director of the Whitehead Iron and Steel Co., Ltd., who died on March 27, aged 61 years, left £377,265, with net personalty £349,690.

DR. F. A. PANETH, Ph.D. (Vienna), has been appointed to the University Readership in Atomic Chemistry tenable at the Imperial College (Royal College of Science), London, as from October 1, 1938. Since 1933 he has been a consultant of Imperial Chemical Industries, Ltd., and has been engaged in research work with post-graduate students at the Imperial College.

DR. G. R. HOWAT, a member of the staff of the Hannah Dairy Research Institute, Ayr, has been selected by the Colonial Office for the post of analytical chemist in the medical department, Gold Coast. Dr. Howat joined the Institute staff in 1935, and he has made a special study of the various technical problems involved in the processing of milk and the manufacture of milk products. He has also undertaken investigations into the factors affecting the solubility and storage of milk powders and into the causes of a number of defects which are liable to occur in canned dairy products.

MR. R. SCORGIE, assistant chemist at Guardbridge Paper Mills, has been appointed to the chemistry department at the Kelvindale Paper Mills, Glasgow.

MR. WILLIAM WIGGINS COCKER, head of the firm of Dickinson and Son, paint manufacturers, Church, has been appointed a magistrate for Accrington.

MR. G. W. BEAUMONT and MR. J. F. HARDWICK, who have been honorary secretary and honorary assistant secretary respectively of the Liverpool and North Western Section of the Institute of Chemistry for the last four years, and who retired at the close of the last session, recently received presentations in recognition of their services. MR. R. R. BUTLER, principal of the City Technical College, will be chairman of the section during the forthcoming session.

DR. J. B. FIRTH, F.I.C., and DR. J. E. DRIVER, members of the staff of the department of chemistry, Nottingham University College, are resigning. Dr. Firth has been appointed Home Office expert and director of the North Western Forensic Science Laboratory at Preston. Dr. Driver has been elected to a post of demonstrator in chemistry at Cambridge University. He has played a prominent part in the development of pharmaceutical and technical classes at Nottingham University College.

OBITUARY

MR. HAROLD DOUGLAS ELKINGTON, F.I.C., has died, aged 48.

MR. JOHN BOND, O.B.E., the Southport Corporation gas engineer from 1905 to 1934, and president of the Institution of Gas Engineers in 1914, died at Southport on June 28, at the age of 69. During the War he obtained for the Ministry of Munitions increased quantities of products for high explosives by a plant which he designed at Southport gas works.

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From Week to Week

An Index to Volume xxxviii of The Chemical Age (January-June, 1938) is published with this issue. It will be found between the last advertisement page and the inside back cover, and is easily detached for binding purposes.

Out of 980 fires to which the Manchester Fire Brigade were summoned during the past year, only four occurred at paint stores and the premises of paint and varnish manufacturers.

Super-Centrifugal Engineers, Ltd., has changed its name to Sharples Centrifuges, Ltd., as from June 18, this being for the sole purpose of identifying the company with the name of its founder.

The Commissioner for the Special Areas in England and Wales visited Pallion, Sunderland, on June 29, and formally declared open the site which has been developed on his behalf by the North Eastern Trading Estates, Ltd. Two factories have already been established on the site for the Saturn Oxygen Co., and King and Co. (Sunderland), Ltd.

On the recommendation of the Import Duties Advisory Committee, the Treasury has issued an order further increasing as from to-morrow the rates of drawback in respect of soya beans used in the manufacture of soya bean oil and soya bean flour. The increases are consequent upon the rise in the average price of imported soya beans.

The Import Duties Advisory Committee give notice of applications for increases in the import duties on mercuric chloride and mercurous chloride. Any representations which interested parties may desire to make should be addressed in writing to the Secretary, Import Duties Advisory Committee, Shell-Mex House, Strand, London, W.C.2, not later than July 28, 1938.

Imperial Chemical Industries, Ltd., have issued a new booklet describing a method of producing heavy shades of good fastness to light, perspiration and milling, on wool-viscose staple fibre material. This booklet has been produced to supplement the information given in a previous publication—"Fast Solid Shades on Wool Viscose Staple Fibre Fabrics," and in the Viscrome Dyestuffs pattern card.

The Department of Scientific and Industrial Research has issued the third of a series of publications dealing with research into the problems of lubrication ("The Friction of an Oscillating Bearing," Lubrication Research Technical Paper No. 3, Stationery Office, price 9d.). This report describes the results of variations in the three main factors influencing friction, namely, speed, load and temperature. It is indicated that mineral oils are inferior to vegetable oils for lubrication of an oscillating bearing at all frequencies, but that an improvement can be obtained in the lubricating quality of mineral oils by the addition of small amounts of fatty acid or vegetable oil.

The first copper refinery in Yugoslavia, the most important producer of copper in Europe, was put into operation on July 2, at Bor, in Eastern Serbia. Its capacity will soon be 20,000 tons of electrolytic copper. This refinery is the work of the German firm of Siemens and Co., and is owned by the French Mines de Bor Co. It is reported that the Government have now reached an agreement with the Trepca Mines, Ltd., for the smelting of zinc and lead in Serbia. A new company will now be formed in London which will comprise four British mining companies already working in Yugoslavia, whose capital will be increased by another £400,000 to £2,570,000. The new plant will cost about £1,000,000 and the work will start in September this year.

Notice was given in Tuesday's "London Gazette" of new Regulations and Orders made by the Home Secretary under the Factories Act, 1937, which came into force on July 1. The following regulations were made on June 30: "Factory Overtime (Separation of Different Parts or Sets) Regulations, 1938," and "Operations at Unfenced Machinery Regulations, 1938." These regulations will come into force on August 1, 1938. An order postpones from July 1, 1938, until January 1, 1930, the coming into operation of certain requirements of the Act in certain cases, namely: (1) The requirement contained in subsection (2) of Section 13 of the Act as respects factories in which the main transmission machinery is driven wholly or partly by water power; (2) the requirements contained in subsections (3), (4), (5) and (7) of Section 22 of the Act as respects hoists or lifts constructed or reconstructed before the passing of the Act in warehouses to which the provisions of Section 22 are applied by subsection (3), of Section 105 of the Act, subject to the condition that the hoist or lift shall be securely fenced so far as is reasonably practicable. Copies of the regulations and orders may be obtained at the Stationery Office.

Work on the new £1,000,000 steelworks at Jarrow was started on July 1 when a local contractor began the reconditioning of buildings for offices.

The International Nitrate Producers met in Paris on June 29 and 31, to negotiate a renewal of the cartel agreements. A new agreement has not yet been reached, and the negotiations are to be resumed in London.

The falling demand for steel has necessitated the blowing out of a blast furnace at the Cargo Fleet Ironworks, Middlesbrough. This is the sixth blast furnace to be laid idle in the Tees-side district in the past six weeks.

The Chemical Society announces that from July 16 until September 30 the library will open daily from 10 a.m. to 5 p.m. except during the fortnight August 1 to 13 inclusive, when it will be entirely closed for revision and cleaning.

A series of information sheets illustrating the use of wood in the construction of tanks and vats, for the chemical and chemical-using industries, has been issued by Carty and Son, Ltd. They are perforated so that they can be filed for future reference.

The Manchester Section of the Oil and Colour Chemists' Association has received an invitation from the Scottish Section for members to attend the annual dinner and dance to be held at Glasgow on October 14. Opportunity will be taken to visit the Empire Exhibition on October 15.

Additions to the I.C.I. range of "Solochrome" dyestuffs ("Solochrome" Navy Blues BM, 2GM and 2RM) are shown on a new colour card. These three dyestuffs should prove particularly useful for the production of middle and dark shades of navy blue on loose wool, slubbing and piece goods.

A new catalogue of W. Edwards and Co., presents a range of new high vacuum pumps, each of which incorporates improvements on conventional models. It also tells in easily understood language the theory of vacuum technique, how vacuum is measured, how systems are built, including data, charts, graphs and tables.

Mopump products are illustrated in a new brochure (No. 514) of Rhodes, Brydon and Youatt, Ltd. The principle of the patent Mopump is one of "unit construction," thus doing away with baseplate and coupling. By this unit method of assembly permanent, accurate alignment of pump and motor is ensured and there is no fear of distortion when erecting on site.

The Rothamsted Experimental Station at Harpenden, which is the oldest agricultural research institution in the world, has been granted £14,500 by the Government to meet half the cost of building extensions. The station hopes to celebrate its centenary in 1943 with a comprehensive building scheme. The experimental field plots and laboratories of Rothamsted were open for inspection by visitors on June 29, when Lord Faversham, Parliamentary Secretary to the Minister of Agriculture, was present.

The agreement between J. and J. Colman, Ltd., and Reckitt and Sons, Ltd., was ratified at an extraordinary meeting of J. and J. Colman, Ltd., on June 30. Sir Jeremiah Colman said it was difficult to set out the definite advantages of the amalgamation, and they did not anticipate substantially increased profits during the first few years, but the alliance would materially strengthen the trading position and prospects of the two companies and result in economies. The basis of the trade would be broader, which should tend to even-out the fluctuations to which all trades were subject.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Palestine.—A firm in Tel-Aviv wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of chemicals, cosmetics and patent medicines. (Ref. No. 14).

British India.—The Director of Contracts, Army Headquarters, Simla, invites tenders for 78 tons zinc cake, grade A or B, to B.S. specification No. 220 (schedule 1), and 172 tons copper ingot electrolytic to specification O.F.C. 153/I.A. (schedule 2). Forms of tender obtainable from the Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1, at a fee of 5s. (for each schedule). Tenders must provide for delivery of the stores in India and for payment in India rupees. Tenders must be cabled direct to The Director of Contracts, Army Headquarters, Simla, to reach him not later than Schedule 1: 12 noon Indian Standard Time, July 6, 1938; Schedule 2: 11 a.m. Indian Standard Time, July 6, 1938.

Inventions in the Chemical Industry

The following information is prepared from the **Official Patents** Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

MANUFACTURE OF WATERPROOF PAPER.—I. G. Farbenindustrie. (Germany, June 25, '37.) 18409.

MANUFACTURE, ETC., OF THIOACETALS.—I. G. Fardenindustrie, and G. W. Johnson. 18266.

MANUFACTURE OF EMULSIONS comprising tetraethyl-thiuram-monosulphide.—Imperial Chemical Industries, Ltd. (United States, June 22, '37.) 18601.

MANUFACTURE, ETC., OF CARBOXYLIC ACID ESTERS of mono-chlorhydrin.—G. W. Johnson (I. G. Farbenindustrie.) 17939.

COATING AGENTS, ETC.—G. W. Johnson (I. G. Farbenindustrie.) 18264.

APPARATUS FOR THE PREPARATION OF HYDROCARBONS from carbon monoxide and hydrogen.—G. W. Johnson (I. G. Farbenindustrie.) 18265.

PREPARATION OF SHAPED STRUCTURES from polymerised vinyl chloride substances.—G. W. Johnson (I. G. Farbenindustrie.) 18439.

REDUCTION OF METAL OXIDES.—G. W. Johnson (I. G. Farbenindustrie.) 18562.

PROCESSES FOR INCREASING THE SEDIMENTATION VOLUME of insoluble solid materials, etc.—A. King. 18300.

PRODUCTION OF UNSATURATED BODIES from sugars, etc.—W. F. Koch. 18196.

MANUFACTURE OF DEPOLARISING SUBSTANCES.—Leclanche Soc. Anon. (Germany, June 23, '37.) 18107; (Switzerland, Oct. 29, '37.) 18107.

PRODUCTION OF PRODUCTS FROM HYDROXY-KETONES, ETC.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, Jan. 21.) 17968.

PROCESSES FOR ISOMERISING FATTY OILS, ETC.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Holland, May 12.) 18471.

CAR AND PAINT POLISH.—L. S. Ormiston. 18491.

COLOURED COATINGS FOR LEATHER, ETC.—G. R. Palmer, and L. A. S. Palmer. 18317.

MANUFACTURE OF DRYING OILS.—J. E. Pollak (Naamlooze Vennootschap Industrieele Maatschappij voorheen Noury and Van der Lande.) 18274.

PRODUCTION OF SALTS.—M. Randall. (United States, June 19, '37.) 18269.

MANUFACTURE OF STEEL.—Röchling'sche Eisen-und Stahlwerke Ges. (Oct. 21, '36.) 18464.

MANUFACTURE OF ACETIOCHOLYLGLOXALS.—Schering, A.-G. (Germany, June 21, '37.) 17978.

MANUFACTURE OF COMPOUNDS OF THE SYNTHESIS of the corpus luteum hormone.—Schering, A.-G. (Germany, June 21, '37.) 17979.

MANUFACTURE OF ALDEHYDO-ANDROSTANES.—Schering, A.-G. (Germany, June 21, '37.) 18483.

SEPARATION OF ZIRCONIUM CHLORIDE from ferric chloride, etc. W. O. H. Schornstein, and J. Theberath. 18370.

SEPARATION OF TITANIUM CHLORIDE from mixtures of chlorides. W. O. H. Schornstein, and J. Theberath. 18472.

PRODUCTION OF PHOSPHORIC ACID, ETC.—W. Siegel. 18319.

PRODUCTION, ETC., OF POLYISOBUTYLENE MIXTURES.—Siemens-Schuckertwerke, A.-G. (Germany, June 18, '37.) 17969.

ELECTROLYTIC DEPOSITION OF ZINC DUST.—Siemens and Halske, A.-G. (Germany, June 18, '37.) 18092.

PROCESS, ETC., FOR THE CONTINUOUS DISTILLATION, ETC., OF LIQUIDS.—Soc. Generale de Fours a Coke Systemes Lecocq Soc. Anon. (Belgium, June 21, '37.) 18270; (Belgium, July 10, '37.) 18271; (Belgium, Oct. 6, '37.) 18272.

METHODS FOR OBTAINING LIME-STONE.—Soc. Industrielle des Carburants and Solvants. (France, June 26, '37.) 18546.

CATALYTIC, ETC., EXCHANGES.—Soc. Industrielle des Carburants and Solvants. (France, June 26, '37.) 18547.

PRODUCTION OF FAST TINTS on cellulosic fibres.—Soc. of Chemical Industry in Basle. (Switzerland, June 19, '37.) 18253; (Switzerland, May 11.) 18254.

MANUFACTURE OF DERIVATIVES OF CHRYSENE.—Soc. of Chemical Industry in Basle. (Switzerland, June 21, '37.) 18394; (Switzerland, Sept. 14, '37.) 18395; (Switzerland, Dec. 1, '37.) 18396; (Switzerland, Dec. 20, '37.) 18397; (Switzerland, March 2.) 18398; (Switzerland, May 18.) 18399.

MANUFACTURE OF NITROGENOUS CONDENSATION PRODUCTS.—Soc. of Chemical Industry in Basle. (Switzerland, June 21, '37.) 18400; (Switzerland, Sept. 14. '37.) 18401; (Switzerland, Dec. 1, '37.) 18402; (Switzerland, Dec. 20, '37.) 18403; (Switzerland, March 2.) 18404; (Switzerland, May 18.) 18405.

TREATMENT OF TEXTILE MATERIALS.—Tootal Broadhurst Lee Co., Ltd., F. C. Wood, and W. H. Watson. 18326.

TREATMENT OF MINERAL OIL PRODUCTS.—Trinidad Leaseholds, Ltd., and E. Hene. 18170.

SEPARATION OF OLEFINES from gaseous mixtures.—Usines de Melle. (France, June 30, '37.) 18278.

DYESTUFF MIXTURES, ETC.—Soc. of Chemical Industry in Basle. (Switzerland, June 22, '37.) 18554; (Switzerland, May 24.) 18555.

VULCANISATION OF RUBBER.—Wingfoot Corporation. (United States, Sept. 24, '37.) 18025.

PRODUCTION OF HYDROGEN PEROXIDE.—G. Adolph, and M. E. Bretschger. (United States, July 26, '37.) 19158.

MANUFACTURE OF ZIRCONIUM COMPOUNDS.—A. G. Allen (Stockton), Ltd., and D. Tyrer. 18999.

DULCITAL BORATES, ETC.—Atlas Powder Co. (United States, June 23, '37.) 18660.

TREATMENT OF COAL.—E. Berl. 18667.

MANUFACTURE OF TITANIUM PIGMENTS.—British Titan Products Co., Ltd., A. G. Oppegaard, and C. J. Stopford. 18645.

MANUFACTURE OF COPPER ACETOARSENITE.—Chemische Fabrik von J. E. Devrient, A.-G. (Germany, June 30, '37.) 18828.

PREPARATION OF ACTIVE GLUCOSIDES from digitalis lanata.—Chinoin Gyógyszer és Vegyészeti Termékek Gyára Reszvenytarsasag Dr. Kereszty and Dr. Wolf. 18848.

PRODUCTION OF FATTY ACID ESTERS from starch factory by-products.—Corn Products Refining Co. (United States, August 14, '37.) 19355.

MANUFACTURE OF STARCH PRODUCTS.—Corn Products Refining Co. (United States, August 16, '37.) 19356.

PRECIPITATION OF ZEIN by spraying.—Corn Products Refining Co. (United States, August 18, '37.) 19357.

LACQUERS.—Crosse and Blackwell Ltd., W. Clayton, H. K. Dean, and R. I. Johnson. (June 7.) 19291.

CARBONISING, ETC., OF FUEL.—Didier-Werke, A.-G. (Germany, Oct. 21, '37.) 18931.

PRODULTION OF COKE.—F. L. Duffield. 19166.

PRODUCTION OF GAS for the manufacture of methyl alcohol.—F. L. Duffield. 19167.

LUBRICANTS.—E. I. du Pont de Nemours and Co. (United States, June 25, '37.) 18703.

PRODUCTION OF ALIPHATIC ACIDS, ETC.—E. I. du Pont de Nemours and Co. (United States, June 26, '37.) 19057.

MANUFACTURE OF BASIC NITROGENOUS COMPOUNDS.—E. I. du Pont de Nemours and Co. (United States, June 29, '37.) 19343.

OXIDATION OF HYDROCARBONS.—E. I. du Pont de Nemours and Co. (United States, June 29, '37.) 19344.

ELECTRODEPOSITION OF ZINC.—E. I. du Pont de Nemours and Co., and R. O. Hull. 18704.

REFINING OF HYDROCARBON OILS.—Edeleanu-Ges., and F. B. Dehn (Edeleanu-Ges.). (June 8, '37.) 19184.

MANUFACTURE OF SULPHUR-CONTAINING ORGANIC COMPOUNDS.—S. Ellingworth, F. L. Rose, and Imperial Chemical Industries, Ltd. 19056.

ORGANIC OXIDATION PROCESSES, ETC.—E. W. Fawcett, and Imperial Chemical Industries, Ltd. 19055.

MANUFACTURE OF BLACK TRISAZO DYESTUFFS.—J. R. Geigy, A.-G. (Switzerland, July 1, '37.) 19296.

MAGNESIUM ALLOYS.—G. von Giesche's Ezben. (Germany, Aug. 10, '37.) 19348.

MEANS FOR ALLAYING CORROSION.—W. V. Gilbert, 19244.

PROCESS OF POLYMERISING 2-CHLOROBUTADIENE-1:3.—W. W. Groves (I. G. Farbenindustrie.) 18661.

MANUFACTURE OF PHENOLS.—W. W. Groves (I. G. Farbenindustrie.) 18662.

MANUFACTURE OF VINYL-ACETYLENE.—W. W. Groves (I. G. Farbenindustrie.) 18774.

IMPROVEMENT OF FIBROUS MATERIALS.—W. W. Groves (I. G. Farbenindustrie.) 18775.

MANUFACTURE OF SOLUBLE DERIVATIVES OF AZO-DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) 19304.

MANUFACTURE OF AZO-DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) 19305.

CATALYSIS.—Houdry Process Corporation. (United States, Aug. 5, '37.) 19285.

MANUFACTURE OF VAT DYESTUFFS.—I. G. Farbenindustrie. (Germany, June 25, '37.) 18841.

PROCESS FOR THE REMOVAL OF IRON from solutions of aluminium salts.—I. G. Farbenindustrie. (Germany, July 16, '37.) 19183.

MANUFACTURE OF ARTIFICIAL THREADS.—I. G. Farbenindustrie. (Germany, June 29, '37.) 19307.

STEEL.—Inland Steel Co. (United States, Nov. 30, '37.) 19010; (United States, May 14.) 19011.

MANUFACTURE, ETC., OF OLEFINE OXIDES.—G. W. Johnson (I. G. Farbenindustrie.) 18791.

MANUFACTURE, ETC., OF WETTING AGENTS.—G. W. Johnson (I. G. Farbenindustrie.) 18792.

MANUFACTURE, ETC., OF OXIDATION PRODUCTS of olefine glycols. G. W. Johnson (I. G. Farbenindustrie.) 19023.

MANUFACTURE, ETC., OF ORGANIC COMPOUNDS containing sulphur, etc.—G. W. Johnson (I. G. Farbenindustrie.) 19024.

MANUFACTURE, ETC., OF SULPHONIC ACIDS.—G. W. Johnson (I. G. Farbenindustrie.) 19156.

MANUFACTURE OF CELLULOSE DERIVATIVES.—J. E. Jones, and J. C. Harrop. 18784.

MANUFACTURE OF POWER GAS.—L. B. Jones. 18826.

PREPARATION OF A PRODUCT FOR BLENDING LIQUID FUEL, hydrocarbons, alcohols, etc.—I. Lovens. (Luxembourg, July 2, '37.) 18684; (Luxembourg, Sept. 1, '37.) 18685; (Luxembourg, Dec. 28, '37.) 18686; (Luxembourg, May 23.) 18687.

PRODUCTION OF METALLIC MAGNESIUM from its oxidic compounds.—Magnesium Metal Corporation, Ltd. (American Magnesium Metals Corporation). 18764.

THERAPEUTICALLY VALUABLE COMPOUNDS.—May and Baker, A. J. Ewins, H. J. Barber, and A. D. H. Self. 18836.

MANUFACTURE OF HETEROCYCLIC COMPOUNDS.—May and Baker, Ltd., A. J. Ewins, and M. A. Phillips. 18694.

MANUFACTURE OF CAST IRON.—Meehanite Metal Corporation. (United States, April 14.) 19049.

MANUFACTURE OF AMINO-METHYLENE KETONES, ETC.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. 18708.

TREATMENT OF WASTE MATERIALS containing organic substances of animal, etc., origin.—K. Petersen. (Denmark, June 29, '37.) 19181.

Specifications Open to Public Inspection

TREATMENT OF MINERAL OILS.—Standard Oil Development Co. Dec. 24, 1936. 3833/37.

DESULPHURISATION OF GASOLINES.—Standard Oil Development Co. Dec. 23, 1936. 26870/37.

SULPHONATED PRODUCTS and process of preparation.—Colgate-Palmolive-Peet Co. Dec. 21, 1936. 32116/37.

PROCESS FOR SEPARATING SULPHURIC ACID from mixtures of sulphuric acid and sulphuric acid esters.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Dec. 24, 1936. 32546/37.

PROCESS FOR THE PREPARATION OF ISOQUINOLINE DERIVATIVES.—F. Kulz, and C. A. Hornung. Dec. 22, 1936. 33546/37.

MANUFACTURE OF HYDANTOINS containing the sterol nucleus.—Soc. of Chemical Industry in Basle. Dec. 24, 1936. 34232.

MANUFACTURE OF METALLURGICAL PRODUCTS.—R. Mautsch. Dec. 24, 1936. 34373/37.

TREATMENT OF ORGANIC ACID ANHYDRIDES.—British Celanese, Ltd. Dec. 24, 1936. 34757/37.

CONCENTRATION OF ALIPHATIC ACIDS.—British Celanese, Ltd. Dec. 22, 1936. 34856/37.

MEANS FOR AND METHOD OF WELDING or depositing metals or alloys.—J. B. Forster, and J. Finn. Dec. 24, 1936. 35256/37.

COATING ARTICLES.—Bakelite, Ltd. Dec. 24, 1936. 35287/37.

RESINOUS COATING-COMPOSITIONS and products coated therewith.—Bakelite, Ltd. Dec. 22, 1936. 35288/37.

OIL COMPOSITIONS.—Bakelite, Ltd. Dec. 22, 1936. 35289/37.

METHOD OF MANUFACTURE OF A FIRE-PROOFING MATERIAL, and its application.—Etablissements Bouillon Freres. Dec. 21, 1936. 35422/37.

PROCESS FOR THE MANUFACTURE OF THERAPEUTICALLY-VALUABLE GOLD COMPOUNDS.—Schering, A.-G. Dec. 23, 1936. 35426/37.

PROCESS FOR THE MANUFACTURE OF OXO COMPOUNDS of the cyclopentano-polyhydrophenanthrene series.—Schering, A.-G. Dec. 22, 1936. 35538/37.

MANUFACTURE OF TITANIUM PIGMENTS.—Titan Co., Inc. Dec. 24, 1936. 35547/37.

MANUFACTURE OF CARBONIC ACID DERIVATIVES.—Soc. of Chemical Industry in Basle. Dec. 24, 1936. 35625/37.

PROCESS FOR THE MANUFACTURE OF BENZANTHRONE DERIVATIVES.—I. G. Farbenindustrie. Dec. 24, 1936. 35677/37.

PROCESS AND APPARATUS FOR THE ELECTROLYSIS OF AQUEOUS SOLUTIONS.—E. I. du Pont de Nemours and Co. Dec. 24, 1936. 35801/37.

MANUFACTURE OF SHAPED ARTICLES from cellulose acetate.—I. G. Farbenindustrie. Dec. 24, 1936. 35814/37.

METHOD OF PREPARING A SOLUTION OF CELLULOSE and method of producing rayon.—Ridgway, Whiting, and Boden-Schatz, Inc. Nov. 27, 1936. 18654/38.

MANUFACTURE OF RUBBER CHLORIDE COMPOSITIONS.—Raolin Corporation. March 17, 1936. 18707/37.

Specifications Accepted with Dates of Application

PRODUCING SOAP.—Refining, Inc. Sept. 26, 1935. 487,399.

MEANS FOR GENERATING AND REGULATING PRESSURE GAS from chemical reactions.—W. Kochmann. Sept. 18, 1936. 487,400.

MANUFACTURE OF DERIVATIVES OF α-OXYNAPHTHOIC ACID.—W. W. Groves (I. G. Farbenindustrie.) Sept. 22, 1936. 487,770.

PRODUCTION OF STIGMASTEROL.—E. W. Fawcett, J. R. Myles, and Imperial Chemical Industries, Ltd. Sept. 22, 1936. 487,771.

MANUFACTURE AND PRODUCTION OF SURFACE-ACTIVE AGENTS.—G. W. Johnson (I. G. Farbenindustrie.) Oct. 20, 1936. 487,669.

MANUFACTURE OF MIXED POLYMERISATION PRODUCTS soluble in benzine.—W. W. Groves (I. G. Farbenindustrie.) Oct. 22, 1936. 487,593.

REMOVAL OF HYDROGEN SULPHIDE from hydrocarbon liquids.—G. W. Johnson (I. G. Farbenindustrie.) Nov. 23, 1936. 487,673.

PURIFICATION OF WATER.—A.-G. Fur Hydrologie. Jan. 29, 1936. 487,675.

PRODUCTION OF DRYING OIL COMPOSITIONS from non-drying oils.—S. L. M. Saunders. Dec. 19, 1936. 487,681.

PRODUCING FAST DYEINGS ON MIXED FABRICS of wool and viscose artificial silk.—G. W. Johnson (I. G. Farbenindustrie.) Dec. 21, 1936. 487,409.

MANUFACTURE OF HIGHLY CONCENTRATED VERMIN-DESTROYING AGENTS and the like, emulsifiable in water.—Deutsche Hydrierwerke, A.-G. Dec. 21, 1935. 487,503.

SEPARATION OF MIXTURES OF VOLATILE INORGANIC CHLORIDES or/and oxychlorides.—W. O. H. Schornstein, and J. Theberath. Dec. 27, 1935. 487,834.

PRODUCTION OF DYESTUFF PIGMENT PASTES.—I. G. Farbenindustrie. Jan. 6, 1936. 487,601.

MANUFACTURE OF IMPROVED PIGMENTS.—A. G. Bloxam (Soc. of Chemical Industry in Basle.) Dec. 22, 1936. (Sample furnished.) 487,835.

PROCESS FOR THE MANUFACTURE OF POLYMERISATION PRODUCTS.—A. Carpmael (I. G. Farbenindustrie.) Dec. 22, 1936. 487,604.

PRODUCTION OF MAGNESIUM.—Magnesium Elektron, Ltd. (I. G. Farbenindustrie.) Dec. 22, 1936. 487,836.

FERMENTATION OF ORGANIC MATTER.—L. Boggiano-Pico, D. M. Proctor, Mitchell Engineering, Ltd., and Wellesley Holdings, Ltd. Dec. 22, 1936. 487,837.

COLOURING ARTIFICIALLY-PRODUCED OXIDE FILMS on aluminium and its alloys.—F. Hill, J. A. Radley, and Imperial Chemical Industries, Ltd. Dec. 22, 1936. 487,605.

APPARATUS FOR THE CATALYTIC TREATMENT OF HYDROCARBONS and the regeneration of the catalyst used therein.—Houdry Process Corporation. Jan. 13, 1936. 487,785.

RECOVERY OF PURE SODIUM CYANIDE.—G. W. Johnson (I. G. Farbenindustrie.) Dec. 24, 1936. 487,606.

MANUFACTURE OF ARTIFICIAL RESIN COMPOSITIONS of low-temperature sensitivity.—Rohm and Haas, A.-G. Dec. 28, 1935. 487,795.

VAT DYESTUFFS.—F. Irving, and C. Shaw, and Imperial Chemical Industries, Ltd. Dec. 24, 1936. 487,798.

MANUFACTURING IRON BY DIRECT REDUCTION.—K. Kusaka, and H. Ashida. Dec. 30, 1936. 487,692.

TREATMENT OF UNBLEACHED, impure, semi-chemical, and like cellulose pulps.—U. Pomilio. Feb. 13, 1936. 487,701.

PRODUCTION OF PIG-IRON.—O. Rolfsen. Feb. 26, 1937. (Convention date not granted.) 487,439.

MANUFACTURE AND PRODUCTION OF COMPOUNDS of the perylene series.—G. W. Johnson (I. G. Farbenindustrie.) Feb. 26, 1937. 487,705.

METHOD OF TREATING WASTE WATER in the manufacture of paper and similarly prepared cellulosic fibrous materials.—A. M. R. Karlstrom. March 15, 1937. 487,805.

PRODUCTION OF MONOAZO DYESTUFFS.—Chemical Works, formerly Sandoz. March 31, 1936. (Samples furnished.) 487,621.

MANUFACTURE AND PRODUCTION OF WATER GAS.—I. G. Farbenindustrie. April 21, 1936. 487,714.

FLUORESCENT MATERIAL and methods of manufacturing the same.—British Thomson-Houston Co., Ltd. April 22, 1936. 487,624.

MANUFACTURE OF 4-NITRO-2-AMINO-1-OXYNAPHTHALENE SULPHONIC ACIDS.—Soc. of Chemical Industry in Basle. May 14, 1936. 487,718.

MANUFACTURE OF NEW VAT DYESTUFFS of the diprazoleanthronyl series.—I. G. Farbenindustrie. June 9, 1936. 487,723.

COLOURING TEXTILES.—Soc. of Chemical Industry in Basle. June 25, 1936. 487,724.

DYEING AND PRINTING ACETATE ARTIFICIAL SILK.—I. G. Farbenindustrie. July 25, 1936. (Sample furnished.) 487,725.

MANUFACTURE OF STARCH.—L. Mellersh-Jackson (Merco Centrifugal Co.). July 20, 1937. 487,552.

MANUFACTURE OF POLYMERIC AMIDES.—W. W. Triggs (E. I. du Pont de Nemours and Co.). Aug. 23, 1937. 487,734.

CHLORINATED ARALKYL KETONES.—Armour and Co. March 9, 1937. 487,642.

RENDERING TEXTILES WATER-REPELLENT and products therefrom.—M. Flores, and W. Essers (trading as Farberei-Ges. Flores and Co. Vorm Stolte-Missy.) Oct. 16, 1936. (Addition to 474,403.) 487,645.

ELECTROLYTES and method of making the same.—A. A. Thornton (J. B. Brennan.) Oct. 21, 1937. 487,744.

MANUFACTURE AND APPLICATION OF POLYMERISED ALKYLENE OXIDES.—British Celanese, Ltd. Nov. 7, 1936. 487,652.

MANUFACTURE OF ACTIVATED CARBON.—F. Krczil. Nov. 1, 1937. 487,745.

MOTOR FUELS.—Standard Oil Development Co. Dec. 19, 1935. 487,745.

DEHYDRATION OF MIXTURES OF CARBON DIOXIDE and ammonia.—Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges, et Camargue. Dec. 11, 1936. 487,752.

PROCESS FOR THE MANUFACTURE OF AMINO-ALKYLESTERS of carbocyclic acids and of aliphatic amino-alcohols therefrom.—T. Sabalitschka, and E. Bohm. June 22, 1937. 487,824.

PRODUCTION OF ANTHRAQUINONE DYESTUFFS.—J. R. Geigy, A.-G. March 11, 1937. 487,830.

Weekly Prices of British Chemical Products

THE chemical markets are enjoying a better volume of enquiry this week, and in most directions a more cheerful tone is displayed. Buying for spot or nearby requirements has been on a wider scale and for good quantities, and dealers report a renewed interest in fresh contract business. There are no outstanding price alterations to record, values continuing steady with a firm undertone. There is practically no change in the price position for coal tar products, but the market is decidedly steadier in appearance. Sellers are not particularly anxious to enter into commitments at existing price levels, and the market, which already displays a firmer tone, is expected to enjoy a revival of confidence.

MANCHESTER.—Generally inactive trading conditions have been reported during the past week on the Manchester chemical market. Fresh buying interest has been restricted in most classes of materials, and at the moment users are doing little more than place orders for relatively near delivery positions. For the most part, however, they are already pretty well covered for supplies during the next few months, and traders are more interested in the rate at which contracts are being taken up than in adding to existing commitments. Generally speaking, specifications against contracts are only moderate, and in several directions, including the dyeing and finishing trades, there is plenty of room for improvement. The demand for the by-products has continued quiet, and the tendency is easy in several instances.

GLASGOW.—There has been a slight improvement in the demand for general chemicals for home trade during the week, but export business still remains very limited. Prices generally continue steady at about previous figures, copper, lead, and zinc products being very firm on account of the advance in metal prices.

Price Changes

Rises: Lead Acetate, brown (Manchester).

Falls: Potash Caustic (Manchester); Carbolic Acid, Crude, 60's; Cresylic Acid, 97/99 per cent.; 99/100 per cent.; Pale, 99/100 per cent.; Dark, 95 per cent.

General Chemicals

ACETONE.—£45 to £47 per ton.

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £19 per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8¼d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 3½d. per lb. d/d station in 70-lb. cylinders (1-ton lots).

CHROMETAN.—Crystals, 2¾d. per lb.; liquor, £9 10s. per ton d/d station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—10d. per lb., less 2½%; d/d U.K.

CHROMIC OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0¼d. per lb. MANCHESTER: 1s. 0¼d. SCOTLAND: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £17 15s. per ton f.o.b. SCOTLAND: £18 15s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £4 2s. 6d. to £5 2s. 6d. per cwt. according to quantity; in drums, £3 15s. 0d. to £4 7s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £30; brown, £1 per ton less. MANCHESTER: White, £30; brown, £29 10s.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£30 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £30 per ton, less 2¼% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £30 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 5s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. per lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £40 per ton according to quantity, ex store; broken, £42 per ton. MANCHESTER: £38.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £37 per ton.

POTASSIUM DICHROMATE.—5¼d. per lb. carriage paid. SCOTLAND: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 11½d.

POTASSIUM PRUSSIATE.—6½d. per lb. SCOTLAND: 6¾d. net, in casks, ex store. MANCHESTER: Yellow, 6¼d. to 6½d.

PRUSSIATE OF POTASH CRYSTALS.—In casks, 6¾d. per lb. net, ex store.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

Salt Cake.—Unground, spot, £3 11s. per ton.

Soda Ash.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

Soda, Caustic.—Solid, 76/77° spot, 13s. 10s. per ton d/d station. Scotland: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

Soda Crystals.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

Sodium Acetate.—£19-£20 per ton carriage paid North. Glasgow: £18 10s. per ton net ex store.

Sodium Bicarbonate.—Refined spot, £10 15s. per ton d/d station in bags. Glasgow: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. Manchester: £10 10s.

Sodium Bisulphite Powder.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

Sodium Carbonate Monohydrate.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£27 10s. to £32 per ton. Glasgow: £1 11s. per cwt., minimum 3 cwt. lots.

Sodium Dichromate.—Crystals cake and powder 4¼d. per lb. net d/d U.K. with rebates for contracts.

Sodium Chromate.—4¼d. per lb. d/d U.K. 4d. per lb. Glasgow: 4¼d. net, carriage paid.

Sodium Hyposulphite.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. Manchester: Commercial, £11; photographic, £15 10s.

Sodium Metasilicate.—£14 5s. per ton, d/d U.K. in cwt. bags.

Sodium Nitrate.—Refined, £8 per ton for 6-ton lots d/d. Glasgow: £1 12s. 0d. per cwt. in 1-cwt kegs, net, ex store.

Sodium Nitrite.—£18 5s. per ton for ton lots.

Sodium Perborate.—10%, 9¾d. per lb. d/d in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.

Sodium Prussiate.—5d. per lb. for ton lots. Glasgow: 5d. to 5¾d. ex store. Manchester: 4¾d. to 5¼d.

Sodium Silicate.—£8 2s. 6d. per ton.

Sodium Sulphate (Glauber Salts).—£3 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. Scotland: Ground quality, £3 5s. per ton d/d. Manchester: £3 12s. 6d.

Sodium Sulphide.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. Manchester: Concentrated solid, 60/62%, £11; commercial, £8 10s.

Sodium Sulphite.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

Sulphur Precip.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

Sulphuric Acid.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

Tartaric Acid.—1s. 1¼d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. Manchester: 1s. 1¼d. to 1s. 1½d. per lb. Glasgow: 1s. 1d. per lb., 5%, ex store.

Zinc Sulphate.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

Antimony Sulphide.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

Arsenic Sulphide.—Yellow, 1s. 5d. to 1s. 7d. per lb.

Barytes.—£6 to £6 10s. per ton, according to quality.

Cadmium Sulphide.—4s. to 4s. 3d. per lb.

Carbon Black.—3¾d. to 3 15/16d. per lb., ex store.

Carbon Disulphide.—£31 to £33 per ton, according to quantity, drums extra.

Carbon Tetrachloride.—£41 to £46 per ton, according to quantity, drums extra.

Chromium Oxide.—Green, 10½d. to 11d. per lb.

Diphenylguanidine.—2s. 2d. per lb.

India-rubber Substitutes.—White, 4¾d. to 5¼d. per lb.; dark 3¾d. to 4¼d. per lb.

Lamp Black.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

Lead Hyposulphite.—9d. per lb.

Lithopone.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.

Sulphur.—£9 to £9 5s. per ton. Sulphur precip. B.P., £55 to £60 per ton. Sulphur precip. comm., £50 to £55 per ton.

Sulphur Chloride.—5d. to 7d. per lb., according to quantity.

Vermilion.—Pale, or deep, 4s. 9d. per lb., 1-cwt. lots.

Zinc Sulphide.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

Ammonium Sulphate.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

Calcium Cyanamide.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.

Nitro Chalk.—£7 10s. 6d. per ton up to June 30, 1938.

Sodium Nitrate.—£8 per ton for delivery up to June 30, 1938.

Concentrated Complete Fertilisers.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

Ammonium Phosphate Fertilisers.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

Benzol.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s. 8½d. Glasgow: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d. Manchester: Pure, 1s. 7d. to 1s. 8d. per gal.; crude, 11d. to 1s. per gal.

Carbolic Acid.—Crystals, 7½d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 2s. to 2s. 3d.; dehydrated, 3s. to 3s. 3d. per gal. Manchester: Crystals, 7¼d. per lb. f.o.b. in drums; crude, 2s. 3d. per gal.

Creosote.—Home trade, 5d. per gal., f.o.r. makers' works; exports, 6⅜d. to 6⅝d. per gal., according to grade. Manchester: 4½d. to 5d. Glasgow: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils 5¾d. to 6¼d.

Cresylic Acid.—97/99%, 1s. 10d. to 2s. 1d.; 99/100%, 2s. 6d. to 3s. 6d. per gal., according to specification; Pale, 99/100%, 2s. 2d. to 2s. 5d.; Dark, 95%, 1s. 7d. to 1s. 9d. per gal. Glasgow: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. Manchester: Pale, 99/100%, 2s. 6d.

Naphtha.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1d. to 1s. 3d. per gal., naked at works, according to quantity. Glasgow: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

Naphthalene.—Crude, whizzed or hot pressed, £5 5s. to £6 5s. per ton; purified crystals, £11 10s. per ton in 2-cwt. bags. London: Fire lighter quality, £5 to £6 per ton. Glasgow: Fire lighter, crude, £6 to £7 per ton (bags free). Manchester: Refined, £14 10s. per ton f.o.b.

Pitch.—Medium, soft, 33s. per ton, f.o.b. Manchester: 32s. 6d. f.o.b., East Coast. Glasgow: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.

Pyridine.—90/140%, 13s. 6d. to 15s. per gal.; 90/160%, 10s. 6d. to 13s. 3d. per gal.; 90/180%, 3s. 3d. to 4s. per gal. f.o.b. Glasgow: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. Manchester: 10s. to 11s. per gal.

Toluol.—90%, 1s. 10d. per gal.; pure, 2s. 2d. Glasgow: 90%, 120, 1s. 10d. to 2s. 1d. per gal.

Xylol.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s. 3½d. Glasgow: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

Calcium Acetate.—Brown, £7 5s. to £9 15s. per ton; grey, £9 5s. to £9 15s. Manchester: Brown, £8 10s.; grey, £10.

Methyl Acetone.—40.50%, £35 to £40 per ton.

Wood Creosote.—Unrefined, 4d. to 6d. per gal., according to boiling range.

Wood Naphtha, Miscible.—3s. 3d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

Wood Tar.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

Aniline Oil.—Spot, 8d. per lb., drums extra, d/d buyer's works.

Aniline Salts.—Spot, 8d. per lb. d/d buyer's works, casks free.

Benzidine, HCl.—2s. 7½d. per lb., 100% as base, in casks.

Benzoic Acid, 1914 B.P. (ex toluol).—1s. 11½d. per lb. d/d buyer's works.

***m*-Cresol 98/100%.**—1s. 8d. to 1s. 9d. per lb. in ton lots.

***o*-Cresol 30/31° C.**—6½d. to 7½d. per lb. in 1-ton lots.

***p*-Cresol, 34-5° C.**—1s. 7d. to 1s. 8d. per lb. in ton lots.

Dichloraniline.—2s. 1½d. to 2s. 5½d. per lb.

Dimethylaniline.—Spot, 1s. 7½d. per lb., package extra.

Dinitrobenzene.—8¼d. per lb.

Dinitrochlorbenzene, Solid.—£79 5s. per ton.

Dinitrotoluene.—48/50° C., 9¼d. per lb.; 66/68° C., 11d.

Diphenylamine.—Spot, 2s. 2d. per lb., d/d buyer's works.

Gamma Acid, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H Acid.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

Naphthionic Acid.—1s. 10d. per lb.

β-Naphthol.—£97 per ton; flake, £94 8s. per ton.

α-Naphthylamine.—Lumps, 1s. 1d. per lb.

β-Naphthylamine.—Spot, 3s. per lb.; d/d buyer's works.

Neville and Winther's Acid.—Spot, 3s. 3½d. per lb. 100%.

***o*-Nitraniline.**—4s. 3½d per lb.

***m*-Nitraniline.**—Spot, 2s. 10d. per lb. d/d buyer's works.

***p*-Nitraniline.**—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.

Nitrobenzene.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

Nitronaphthalene.—10½d. per lb.; P.G., 1s. 0½d. per lb.

Sodium Naphthionate.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

Sulphanilic Acid.—Spot, 8¾d. per lb. 100%, d/d buyer's works.

***o*-Toluidine.**—11½d. per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—2s. per lb., in casks.

***m*-Xylidine Acetate.**—4s. 8d. per lb., 100%.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ALUMINIUM INDUSTRIES, LTD., Lye. (M., 9/7/38.) June 28, debenture, to Lloyds Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. * £500. November 5, 1937.

CASCELLOID, LTD., Leicester, celluloid manufacturers, etc. (M., 9/7/38.) June 27, charge, to Westminster Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land and factory, etc., at Owen Street, Coalville. * £43,330. April 14, 1938.

GAY WILKINSON, LTD., London, S.E., varnish manufacturers, etc. (M., 9/7/38.) June 24, debenture, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. * Nil. January 7, 1938.

GENERAL STEEL AND IRON CO., LTD., London, W.—June 24, £5,000 2nd debenture, to Edward Le Bas and Co., Ltd.; general charge. * £2,000 debentures. March 2, 1938.

HARDING'S DYE WORKS, LTD., Kingston-on-Thames. (M., 9/7/38.) June 10, £180 further charge, to Kingston Building Society; charged on 68 High Street, Weybridge. * £4,967. January 6, 1938.

Satisfaction

PATON, CALVERT AND CO., LTD., Liverpool, metal polish, etc., manufacturers. (M.S., 9/7/38.) Satisfaction, June 23, of debentures registered June 3, 1935, to extent of £2,200.

Company News

Thomas Owen and Co., Ltd., paper makers, recommend a final dividend of 5 per cent., making 10 per cent., less tax, on the ordinary shares, for the year to March 31. The previous dividend on the ordinary shares was 5 per cent. for 1926-27.

Phoenix Oil Products, Ltd., in their report for 1937, shows profit £50,252 (£51,262); deduct preference dividend £48,000; £6,000 to reserve for taxation (nil); forward £15,292 (£19,041). This company is controlled by Phoenix Oil and Transport.

Glover Paint and Composition, Ltd., announce a net profit for the year to April 30 of £15,370 (£17,784); final of 3½ per cent., making 6 per cent. (same); forward £21,452 (£19,582).

A. Boake, Roberts and Co., Ltd., announce a profit, after provision for depreciation, of £61,838 (£79,386); add transferred from leases reserve £4,065 and amount brought in £90,985, making £156,888. After tax, dividend and other provision amount available is £104,438. Final of 2½ per cent., making 9 per cent. (10 per cent.), free of tax; forward £96,438.

Pilgrim Products, Ltd., manufacturers of chemical, bleaching and other preparations, 18 Essex Street, Strand, W.C.2, has increased its nominal capital by the addition of £7,500, beyond the registered capital of £7,500. The additional capital is divided into 7,500 7 per cent. redeemable cumulative participating preference shares of £1 each. The 7,500 shares of £1 in the original capital have been converted into 2,500 7 per cent. redeemable cumulative participating preference shares of £1 and 100,000 ordinary shares of 1s.

The Distillers Co., Ltd., has maintained its ordinary distribution for the year ended May 15 last at 22½ per cent., less tax, with a final dividend of 12½ per cent. and a bonus of 2½ per cent. The allocation to general reserve is again £400,000, and transfers to the superannuation and provident fund and the fire insurance fund are repeated at £100,000 and £50,000 respectively. The carry-forward is increased by over £100,000, to £444,359, compared with £343,249 last year and £348,781 at the end of 1935-36. The estimated profit is £2,512,469, compared with £2,458,416 actual for 1936-37.

New Companies Registered

Seyatome, Ltd.—Private company. Registered June 27. Capital £100 in 100 ordinary shares of £1 each. To carry on the business of manufacturing and analytical chemists and druggists, manufacturers of and dealers in fertilisers, oils, pigments, beauty preparations, etc. Directors: Lt.-Col. Stuart H. Godfrey, 23 Raphael Street, Knightsbridge, S.W.7; Ralph D. Crawshaw.

Chromol, Ltd. 342,110.—Private company Capital £200 in 200 shares of £1 each. To carry on the business of manufacturers and merchants of metal polishes, polishes of all kinds in paste, powder, liquid or any other form, paints, varnish, enamel, lacquer, shellac, cellulose, size, pigments, compositions, oils, colours, wax, putty, etc. Directors: David Shuttleworth, 56 Redburn Drive, Shipley; Thomas W. Breuninger, Richard L. Swale, George Ball. Registered office: 12 Drake Street, Bradford.

W. and G. Chambers, Ltd. 341,971.—Private company. Capital £12,500 in 12,500 shares of £1 each. To acquire the business of slubbing dyers carried on by W. B. Chambers and Arthur Peel at Knowles Street, Dudley Hill, Bradford, as "W. and G. Chambers." Directors: Arthur Peel, "Hillcrest," Westgate Hill, Bradford; Harold B. Chambers, Percy B. Chambers, George S. Peel.

Chemical and Allied Stocks and Shares

THE stock and share markets have continued to show a more cheerful tendency, and on balance most of the leading industrial securities have again moved in favour of holders. Best prices touched this week were not maintained, as the upward trend in values was followed by profit-taking, and the tendency of markets has been largely dominated by the day-to-day fluctuations of Wall Street.

In sympathy with the surrounding trend, shares of companies associated with the chemical and kindred industries continued to make higher prices. Imperial Chemical are 32s. 7½d. at the time of writing, compared with 31s. 3d. a week ago, and British Oxygen have advanced from 72s. 6d. to 77s. 6d., while Turner and Newall were 83s., a gain of 2s. 9d. on balance. Distillers declined moderately to 98s. 9d., but are now "ex" the final dividend. The latter maintains the distribution for the year at 22½ per cent., and it is apparent from the preliminary statement, which indicates a moderate further increase in profits, that the directors are again following a conservative policy. Petroleum Storage and Finance shares were active following the capital and bonus proposals.

Borax Consolidated were a good feature with a further rise from 24s. 4½d. to 28s. Associated Cement are 84s. 4½d., compared with 82s. a week ago, and most other shares of cement manufacturers were also higher. British Plaster Board, which came in for profit-taking despite the maintenance of the dividend, are now 26s. 6d., but are "ex" the final distribution. General Refractories have been more active in response to the favourable view as to the long term prospects of the iron and steel industry, and have made the improved price of 14s. Stewarts and Lloyds were active around 38s. 3d., following the chairman's statement as to the company's trading experience in the current year. Tube investments also moved in favour of holders, as did Dorman Long, United Steel and other leading iron and steel shares, but best prices were not held later in the week. Richard Thomas ordinary and preference shares were moderately lower following details of the company's capital proposals; a rather higher price was made by the debentures.

Boots Drug, at 43s. 9d., have more than maintained their gain of the previous week, while Beechams Pills 5s. deferred shares have risen to 60s. The market is anticipating that the share "splitting" proposals referred to at the last meeting are likely to be submitted shortly. Sangers were higher at 22s. 7½d. on annual meeting considerations. British Glues 4s. ordinary units transferred at 6s. 1½d. Triplex Glass 10s. units were again active, and at 42s. 9d. are 2s. higher than a week ago. United Glass Bottle transferred around 48s. Fison Packard and Prentice were active and were again quoted at 33s. 9d. Low Temperature Carbonisation 2s. shares have been more active at the rather higher price of 2s. 6d.

Courtaulds were less active this week, but at 37s. 6d. have more than maintained their recent rise; the market expects the interim dividend to be announced about the middle of the month. Coats, English Sewing Cotton, Bleachers, Bradford Dyers and other textile securities were reported to be a rather more active market and prices have improved on balance. British Aluminium, Murex, United Molasses, Wall Paper deferred and British Match were moderately higher. Imperial Smelting, which continued to attract more attention, have improved further to 11s. 9d. at the time of writing. Lever Bros. transferred around 38s. 6d. Swedish Match rose sharply to 26s. 6d., but were inclined to fluctuate in common with most shares with an international market.

"Shell" and other prominent oil shares have appreciated in price, sentiment being assisted by the view that the outlook for the oil industry will be considerably improved in the event of expansion of general trade activity in the United States.